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THIRTY MILLION TONS.

FREIGHT MOVEMENT THROUGH CANALS AT THE SAULT WILL APPROACH THAT FIGURE THIS SEASON—TEN YEARS AGO IT WAS ONLY 8,800,000 TONS AND TWENTY YEARS AGO ONLY 1,500,000 TONS.

Twenty years ago (1881) the movement of freight of all kinds to and from Lake Superior through the Sault was in round numbers 1,500,000 tons; ten years ago (1891) it was 8,800,000 tons; this year (1901) it will be close to 30,000,000 tons. An increase of 2,000,000 to 5,000,000 tons of freight in a single year is not uncommon in this great waterway. The figures are entirely reliable, as they are from reports of the United States engineer officers in charge of the canals. These canal reports are the barometer of lake commerce. They show the wonderful growth of trade to and from the northwest through the harbors of Lake Superior.

Last year the total movement of freight through the canals at the Sault (Canadian and American) was in round numbers 25,600,000 tons. Up to Nov. 1 of this year the aggregate is 24,543,610 tons, so that with a record of late exceeding 4,000,000 tons per month it is quite probable that the total movement for the present season will be very close to the 30,000,000 mark. The only item of freight in which there is still a shortage compared with last year is soft coal. Shipments of soft coal to Nov. 1 of this year foot up 3,318,643 tons, as against 3,585,333 tons on the same date a year ago. Following are tables showing the movement of different items of freight for three years past:

MOVEMENT OF PRINCIPAL ITEMS OF FREIGHT TO AND FROM LAKE SUPERIOR.

ITEMS.	To Nov. 1, 1901.	To Nov. 1, 1900.	To Nov. 1, 1899.
Coal, anthracite, net tons	657,147	435,422	691,977
Coal, bituminous, net tons	3,318,643	3,575,333	2,633,055
Iron ore, net tons	16,283,109	15,255,038	13,307,099
Wheat, bushels	33,026,341	33,340,493	42,988,890
Flour, barrels	6,264,015	5,481,001	5,815,459

REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR, FROM OPENING OF NAVIGATION TO NOVEMBER 1 OF EACH YEAR FOR THREE YEARS PAST.

EAST BOUND.

ITEMS.	Designation.	To Nov. 1, 1901.	To Nov. 1, 1900.	To Nov. 1, 1899.
Copper	Net tons	83,212	110,423	99,503
Grain, other than wheat	Bushels	13,617,843	10,349,003	24,198,127
Building stone	Net tons	42,884	36,657	30,342
Flour	Barrels	6,263,620	5,475,414	5,813,534
Iron ore	Net tons	16,283,109	15,255,038	13,307,099
Iron, pig	Net tons	26,302	17,206	20,676
Lumber	M. ft. b. m.	931,985	765,906	910,508
Silver ore	Net tons	.....	110	.....
Wheat	Bushels	33,026,341	33,340,493	42,988,890
Unclassified freight	Net tons	60,649	62,213	109,092
Passengers	Number	26,870	27,515	22,615

WEST BOUND.

Coal, anthracite	Net tons	657,147	435,422	691,977
Coal, bituminous	Net tons	3,318,643	3,585,333	2,633,055
Flour	Barrels	395	5,587	1,925
Grain	Bushels	56,493	92,784	41,500
Manufactured iron	Net tons	121,128	100,109	153,088
Salt	Barrels	396,236	277,338	281,164
Unclassified freight	Net tons	403,331	367,943	375,491
Passengers	Number	28,685	28,174	24,547

SUMMARY OF TOTAL FREIGHT MOVEMENT IN TONS.

	To Nov. 1, 1901.	To Nov. 1, 1900.	To Nov. 1, 1899.
West bound freight of all kinds, net tons	4,560,898	4,533,787	3,887,124
East bound freight of all kinds, net tons	19,982,712	18,556,979	17,557,630
	24,543,610	23,090,766	21,444,754

	Vessel passages.	Registered tons.
To Nov. 1, 1901	17,421	21,329,455
To Nov. 1, 1900	17,435	20,279,938
To Nov. 1, 1899	17,488	18,852,309

CANADA'S SHIPPING ASPIRATIONS.

The questions of steel ship building in Nova Scotia and the provision of a fast transatlantic service between Canada and Great Britain seem to be intertwined. F. H. Smith of Liverpool, England, a member of the Institution of Naval Architects, has pointed out to Nova Scotians that British ship builders will not establish a branch in the dominion until they first have a guarantee of Canadian support; and another authority points out that nothing definite can be done until the structural steel necessary for ship building is turned out in Canada; while a third authority states that the plant necessary to turn out the number and size of steamers to earn the government and local bonuses will cost at least $2,000,000. Halifax, Dartmouth, Sydney and Louisburg are the ports in Nova Scotia seeking to have a plant located in their midst, whilst St. John, N. B., is planning to establish a yard in connection with the dry dock, for the building of which a company has been formed. The sites proposed for the yards at these ports have been visited by representatives of Swan & Hunter, ship builders on the Tyne, and by Sir Christopher Furness, ship owner, builder and steel manufacturer, and are all spoken favorably of, each having some special points of excellence.

In discussing the question of government aid to the steel ship building industry, Hon. W. S. Fielding, dominion minister of finance, recently pointed out that there were several firms in Canada engaged in building steel vessels of different kinds, and promised consideration to any plans that might be suggested for the extension of the business done by such yards. "While the country would still be able to find employment for the wooden sailing vessels turned out," said Mr. Fielding, "if we are ever to engage in the carrying trade of the world, of which we formerly had so large a share, we must have steel vessels to do it. It would be better that we should buy them abroad than to be without them, but it would be still better to build them ourselves, if that would be feasible, and I have a strong hope that we shall gradually do so. All that I care to say on that point, or on the general question of aid, is that the government is most anxious to see the industry carried on in Canada in a large way, and any reasonable proposals looking to development of that kind would receive very favorable consideration."

In regard to a fast transatlantic line Mr. Fielding said there was very little to be said, but he felt assured that at an early date such action would be taken as would assure a line of which the dominion might be proud. So far as the building of the ships for such a line in Canada was concerned, Mr. Fielding did not look for anything of the kind, if the line was to be established in the near future. It would be too much to expect such a yard as would be required to turn out vessels of that class to be established in Canada at once.

Sir Christopher Furness was interviewed at various points during his tour. He pointed out that Canada would have to pay for a fast service if she wanted it, as such a line would not be self-supporting. He had been considering the question for eight or ten years, and thought a Canadian fast line was far more practical today than it was some time ago. He had considered Quebec as the summer port, with Halifax, St. John or Sydney as the winter port. Sir Christopher was in communication with Lord Strathcona on the subject, and it is reported that the capital is ready for the establishment of a line if an arrangement can be made with the government. Lord Strathcona said Sir Christopher was firmly convinced that only a first-class service would be of any use, a fast service such as could compete with the lines to the United States. Speaking for himself, Lord Strathcona said the short sea passage should be adopted, and the Canadian port should be secured in Cape Breton, as it afforded good harbors and certain kinds of outward freight. "I have," he added, "always taken a very great interest in this question. I have been working at it for years, and I have always maintained that it was a necessary adjunct wherewith to maintain the reputation of our transcontinental route to the east. The Canadian Pacific railway is taking steps to accelerate the speed of its Pacific steamers, and we must have a fast service on the Atlantic."

SUPERPOSED TURRET QUESTION GOES TO CONGRESS.

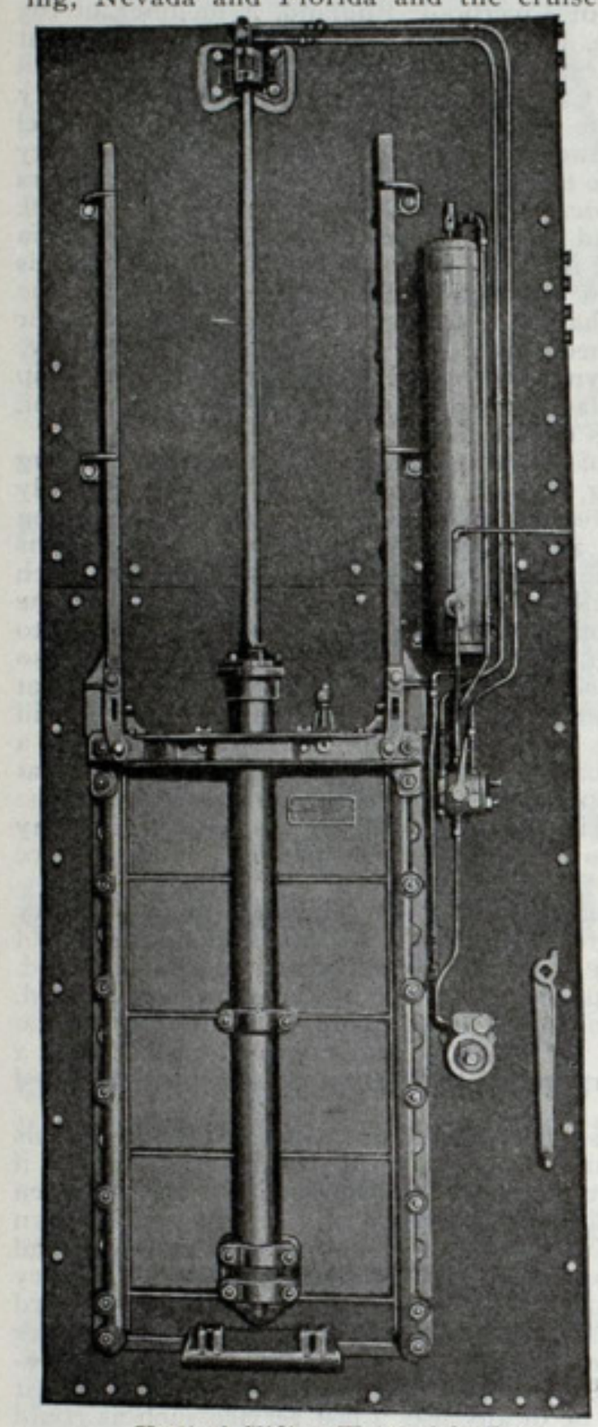
It is quite likely now that the question of the superposed turret will be referred to congress for determination. There is a wide difference of opinion upon the subject among the high ranking officers of the navy. Heretofore the majority of those whose views had been invited by the navy department favored the superposed type and it was adopted for a number of the battleships now under construction and for two now in commission, the Kearsarge, flagship of Rear Admiral F. M. Higginson on the home station, and the Kentucky, flagship of Rear Admiral Frederick Rodgers on the Asiatic station. In the consideration by the board of construction of the plans to be submitted to congress for two first-class battleships, Rear Admiral Bradford, the third member, stood out alone for the superposed type, but he has been joined by Capt. Charles D. Sigsbee, the junior member, making the vote in the board three to two, the majority being composed of Rear Admirals Charles O'Neil, G. W. Melville and F. T. Bowles. In this condition of affairs in the board, Secretary Long sought outside advice. He asked about a hundred naval officers for their views on the subject of the two types of turret. The responses of these officers have been received and show that a majority is in favor of the superposed turret, thus offsetting the effect of the vote in the board of construction adverse to that type. In view of the divergence of views and the fact that the plans for the two battleships must be approved by congress, it is believed at the navy department that a proper disposition of the matter will be its reference to congress for decision.

The United States Steel Corporation has just purchased 15,000 acres of coal land situated in Hancock county, W. Va., and in Greene township, Beaver county, Pa. The property has a frontage of four miles on the Ohio river. The Steel Corporation will develop the property in the spring.

"LONG-ARM" POWER SYSTEM

APPLIED TO BULKHEAD DOORS OF MANY NAVAL VESSELS—SUITED ALSO TO DOORS AND HATCHES OF MERCHANT SHIPS—DESCRIPTION OF THE SYSTEM.

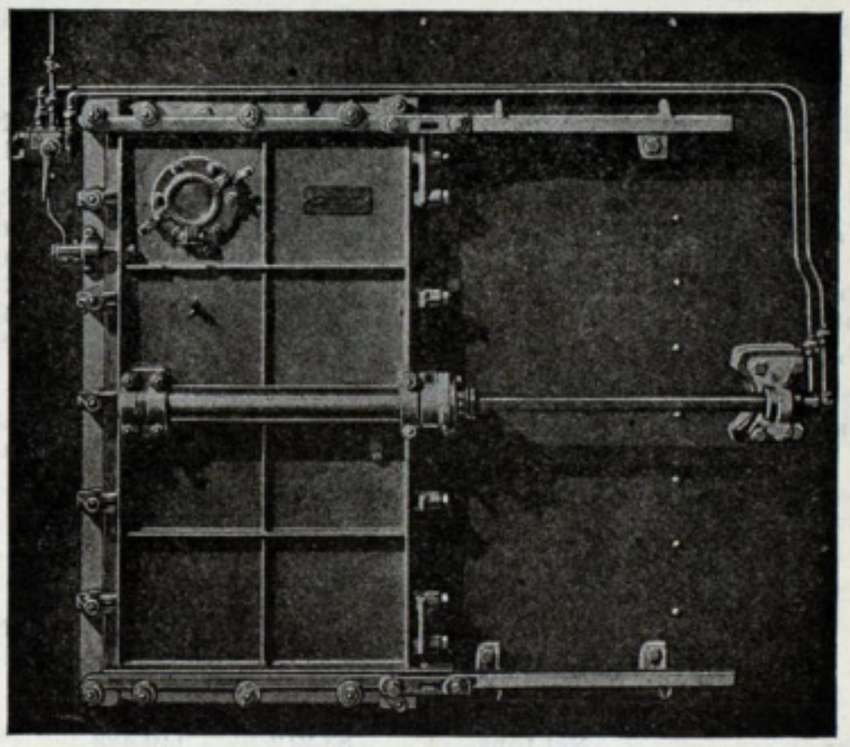
The "Long-Arm" System Co., Cleveland, has, since its organization, installed some 250 "Long-Arm" power doors on ships of the United States navy. Among the vessels which are thus equipped, or are being equipped, are the battleships Maine and Missouri, the monitors Arkansas, Wyoming, Nevada and Florida and the cruisers Chicago, Denver, Cleveland, Des Moines and Chattanooga. Official specifications call for a much larger number of these doors on the vessels which are now being designed. The company has undertaken the manufacture of standardized ship fittings and is now in a position to offer both pneumatic and electric power systems and gears to operate and control its power doors and hatches. The company says that to those interested in passenger liners or ocean-going steam yachts it may at first appear that the "Long-Arm" system is complicated and expensive, but a brief investigation will show that when shorn of some details required in naval ships, but not necessary in the merchant service, the "Long-Arm" is a simple and direct means to accomplish a necessary result with reasonable and moderate outlay. In its argument the "Long-Arm" System Co. says that the most important and effective life-saving device on ships in case of collision or other skin puncture from shell, torpedo, derelict, iceberg or rock, is the hull itself rendered non-sinkable. Boats, life preservers and other devices of this nature, however good, are simply auxiliaries and makeshifts after the hull fails in its flotation. The main point in case of marine disasters has been and always will be to maintain flotation of the hull, if not permanently, at least long enough to bring these auxiliaries into use. Without flotation first being secured in the hull all these auxiliaries are absolutely useless. What is the best scheme to secure this flotation? Hitherto this has been sought through an expensive subdivision of the hull by bulkheads. Doorways are absolutely necessary in many of these bulkheads for efficiency in working the ship. These doorways are the points where the bulkhead system always fails and unless these doors can be closed water-tight, with certainty and promptness, without danger of injuring or imprisoning the working force and without stopping necessary intercommunication, this expensive insurance by bulkheads becomes practically void. It is represented that the "Long-Arm" system secures real and efficient bulkhead insurance at a cost of much less than 1 per cent. of the cost of the ship. The "Long-Arm" power doors with their safety pneumatic and electric power systems have been practically developed by a constructing engineer and ship builder of long experience. They have been found acceptable and have been highly commended in sea service by most critical authorities because safe for the men as well as the ship. The doors and power devices have been standardized and are manufactured on the "interchangeable system" to the several types and sizes found desirable for naval and merchant ships. The company claims that the "Long-Arm" central station power system with its liberty action is the only safe and practical scheme so far devised and adopted on any large scale for perfecting the stability structure and preserving the emergency flotation of modern ships, and there has been hitherto no successful attempt to perfect such devices to a practical state satisfactory to users and suitable for manufacture. The "Long-Arm" liberty action is the novel feature which has especially attracted the attention of experts, and it is this, coupled with good engineering and manufacture, which has made the "Long-Arm" pneumatic and electric systems successful. The successful system must win the confidence and co-operation of the crew instead of arousing fear and combativeness. This can only be done in two ways. The system must relieve the crew from the manual labor of handling heavy doors and hatches, and it must at all times give each man on board full control of any door or hatch which he may desire to use for his duty or safety, thus continually insuring both integrity of the compartments when needed and that intercommunication for duties which may be vital during emergencies.



Vertical Sliding Water-tight Door.

DESCRIPTION OF THE "LONG-ARM" POWER DOOR.

The ordinary sliding door is totally unfit for power operation. It will jam, foul up and wedge fast and there is often too great an interval between tighteners. A swinging door should never be used in an important bulkhead below the main deck. It is dangerous because it cannot be shut against rush of water. Therefore, whatever power system is used the door must be perfected before the power can be supplied satisfactorily. The "Long-Arm" power door is, strictly speaking, not a door but a sliding gate-valve operated by power and working in guides with special arrangements for automatically tightening itself by its own motion when closed and freeing itself when starting to open. There are two types, vertical and horizontal sliding. The latter type is manufactured both "right-hand" and "left-hand." The door-plate is made light and somewhat flexible, having the stiffeners, "plow-share" and seating strips cast on. When unlocked it rides freely in the guides with ⅛ in. or more clearance in all directions. Its edges conform to the action of the tighteners and make a safe closure of the doorway, even when the bulkhead and seat are considerably warped. The guide-frame is cast solid and as heavy and stiff as practicable; it is designed so as to protect all the tightening gear and the seat. The guide-gibs are separate and are bolted on to facilitate the manufacture and maintenance. The bridge, in the vertical type door, spans the guide-frame at the top of clearway to add stiffness and to hold the top-tighteners. The tightening wedges may be cast on the door-plate or on the guide-gibs or both. The tighteners are spaced not over 9 in. between centers throughout the periphery. In the ordinary door now used this spacing is 24 to 30 in. and each tightener is operated separately and by hand. The wedge surfaces throughout are made with an incline of 1 to 8. This prevents all "biting." A door having a wedge that will "bite" is not fit to be used as a safety power-door. Many doors now used have wedges with an incline of more than 1 to 100. In the "Long-Arm" doors every wedge works on a roller, which is another very important item in their success. The side tighteners in the vertical type, and the top and bottom tighteners in the horizontal type, are similar and consist of rollers held in roller-bars extending on each side the full length of guide-gibs, a roller for each wedge—all kept within the guiding gibs to avoid fouling. The roller bars are free and unused throughout the travel, except during the short tightening interval of less than 1 in. at the closing end of the stroke. Within this interval the roller-bars cause the rollers and wedges to engage and press the door-plate against its seat. The bottom tighteners, in the vertical type, are rocking toes secured on a rock-shaft running through eye-bolts which hold the bottom frame to the bulkhead. When the door-plate is free these toes and their connecting web press against the seat by the action of enclosed springs, thus forming a seat guard. During locking the beveled bottom edge of door-plate and "plow-share" (with its slightly raised wedges) first close the clearway and then engage the rollers in points of rocking-toes, opening the latter out until their backs bear on the bottom frame; further movement wedges the bottom of door-plate against the seat. During unlocking the rocker-toes follow in and close on the seat before the clearway is opened. Thus in a coal bunker door, nothing can foul these bottom tighteners and the small amount of coal dust, when it is forced down in, falls through to the floor. It is important in coal-bunker doors to have from 3 to 6 in. drop between the base of frame and top of floor, otherwise these bottom tighteners cannot be expected to keep themselves free automatically. Properly installed these tighteners will remain unclogged when working in fine bituminous coal as repeated and severe tests have proved. The remaining tighteners consist of plain wedges in the door-plate or frame, as the case may be, engaging rollers in brackets. They are not in a position to foul up and can be easily inspected and adjusted.



Horizontal Sliding Water-tight Door.

DESCRIPTION OF THE "LONG-ARM" POWER SYSTEM.

The especially valuable and distinctive features of the "Long-Arm" system are: First, all the principal doors are constructed in such a manner that they will move freely, tightening and releasing positively and automatically, so that they cannot foul or jam and so that they can be shut against a rush of water. Each door must, at any time required, operate independently and with certainty through appliances on the spot, either by power or by hand, and must automatically tighten on its seat by the last of the closing movement and automatically release itself by the first of the opening movement. Second, the system is under direct control from one or more emergency stations placed where desired, so that all doors may be closed simultaneously at any moment by the person first cognizant of danger and so that such emergency closing shall leave absolute control in the hands of any man at the door for his own safety and his own duties. Third, the present endless variation in types of doors, sizes of openings and design of fittings is simplified, standardized and reduced to certain well-considered sizes with interchangeable parts, thus placing this important item in ship fittings on the same footing with

similar standardization in modern railway equipment and gaining all the attendant advantages.

After careful study of all conditions, supplemented by many years' experience at sea and in ship building establishments, the designer of the "Long-Arm" system has decided to recommend the use of compressed air in large installations and electricity in small ones. The simplicity and economy of pneumatic apparatus and the fact that pneumatic power adapts itself to the special requirements of door and hatch operation without being dangerous, or creating discomfort, has been proved. The use of electric power may, however, be desired by owners in many cases, and such use is particularly suitable in small plants where the special pneumatic power station would be relatively more expensive and where there are no other uses for compressed air. The simplicity of using power direct from the electric generators of the ship is sometimes more apparent than real, especially when this power must be surrounded by special safeguards to make it as permanent and reliable as that from the pneumatic power station flasks, but where a storage battery is installed for other purposes it makes electrically-operated doors especially desirable. When the conduit, wiring, fittings and the increased generator capacity are considered it will be found that pneumatic power is cheaper for the large plants and electric power is cheaper for the small plants. The "Long-Arm" System Co. manufactures both.

Some time after the "Long-Arm" hydraulic power system was successfully placed on the principal water-tight doors of the United States cruiser Chicago in 1898 the Bowles-Sprague-Hill "safety system of electric water-tight doors" was devised and constructed by Naval Constructor F. T. Bowles, now the chief constructor of the navy, and the Sprague Electric Co. In this system the successful features of safety for the man and for the ship were the same as those in the "Long-Arm" system. In 1900 the "Long-Arm" System Co. bought the entire United States and foreign rights, patents, business and good will connected with this electric power system for water-tight doors with a view of perfecting it in all possible ways, as would naturally come from practical experience and tests, and embodying it in the "Long-Arm" business. Continued work in this line has resulted in many improvements in detail and much simplification.

SUMMARY OF NAVAL CONSTRUCTION.

The monthly summary of naval construction, issued by the bureau of construction and repair, shows that all the armored cruisers, with the exception of the two awarded to the Union Iron Works of San Francisco, have now been laid down. Undoubtedly the strike has delayed the progress of work at the Union Iron Works. As a whole the statement indicates most favorable progress. The seven submarines are rapidly reaching a stage of completion. Following is the summary:

BATTLESHIPS.		Degree of completion, Per cent.	
Name.	Building at	Oct. 1.	Nov. 1.
Maine	Cramp & Sons	67	70
Missouri	Newport News	45	48
Ohio	Union Iron Works	43	43
Virginia	Newport News	0	0
Nebraska	Moran Bros. Co.	0	0
Georgia	Bath Iron Works	1	2
New Jersey	Fore River Co.	0	2
Rhode Island	Fore River Co.	0	2
ARMORED CRUISERS.			
Pennsylvania	Cramp & Sons	4	6
West Virginia	Newport News	1	2
California	Union Iron Works	0	0
Colorado	Cramp & Sons	7	9
Maryland	Newport News	1	2
South Dakota	Union Iron Works	0	0
SHEATHED PROTECTED CRUISERS.			
Denver	Neafie & Levy	57	58
Des Moines	Fore River Engine Co.	54	57
Chattanooga	Lewis Nixon	46	48
Galveston	Wm. R. Trigg Co.	40	45
Tacoma	Union Iron Works	20	20
Cleveland	Bath Iron Works	67	68
St. Louis	Neafie & Levy	0	0
Milwaukee	Union Iron Works	0	0
Charleston	Newport News	0	0
MONITORS.			
Arkansas	Newport News	71	75
Nevada	Bath Iron Works	91	91
Florida	Lewis Nixon	71	74
Wyoming	Union Iron Works	75	75
TORPEDO BOAT DESTROYERS.			
Bainbridge	Neafie & Levy	99	99
Barry	Neafie & Levy	91	92
Chauncey	Neafie & Levy	93	96
Dale	Wm. R. Trigg Co.	97	97
Decatur	Wm. R. Trigg Co.	98	98
Hopkins	Harlan & Hollingsworth	76	76
Hull	Harlan & Hollingsworth	75	75
Lawrence	Fore River Engine Co.	99	99
MacDonough	Fore River Engine Co.	98	98
Paul Jones	Union Iron Works	85	85
Perry	Union Iron Works	89	89
Preble	Union Iron Works	87	87
Stewart	Gas Engine & Power Co.	62	63
Truxton	Maryland Steel Co.	76	78
Whipple	Maryland Steel Co.	75	77
Worden	Maryland Steel Co.	75	76
TORPEDO BOATS.			
Stringham	Harlan & Hollingsworth	98	98
Goldsborough	Wolff & Zwicker	95	97
Blakely	Geo. Lawley & Son	98	98
DeLong	Geo. Lawley & Son	98	98
Nicholson	Lewis Nixon	95	97
O'Brien	Lewis Nixon	98	98
Thornton	Wm. R. Trigg Co.	97	97
Tingey	Columbian Iron Works	69	70
Wilkes	Gas Engine & Power Co.	87	90
SUBMARINE TORPEDO BOATS.			
Plunger	Lewis Nixon	35	45
Adder	Lewis Nixon	90	92
Grampus	Union Iron Works	51	51
Moccasin	Lewis Nixon	82	85
Pike	Union Iron Works	50	50
Porpoise	Lewis Nixon	78	80
Shark	Lewis Nixon	72	74

GROWTH OF AMERICAN SHIPPING.

AMERICAN TONNAGE HAS NOW PRACTICALLY ATTAINED THE FORMER MAXIMUM GROWTH OF 1861—REPORT OF THE COMMISSIONER OF NAVIGATION.

The report of Mr. Eugene Tyler Chamberlain, the commissioner of navigation, says that the last fiscal year has been the third successive year of notable prosperity and growth in American shipping, exceeding the two previous years. The extent and nature of work under way or projected in ship yards promises an even greater growth for the current fiscal year. American tonnage has now practically attained the former maximum growth of 1861. The figures of 1901, compared with 1861, show an increase in coasting trade vessels from 2,704,544 tons to 4,582,683 tons (two-thirds of the increase being on the great lakes), a decrease in foreign trade vessels from 2,496,894 tons to 879,595 tons, and a decrease in whaling and fishing vessels from 358,375 tons to 61,940 tons. Of the total tonnage 3,623,201 tons are wooden vessels and only 1,901,017 are iron or steel. In 1900 Great Britain launched 1,440,000 tons of steel vessels.

Porto Rico appears in the returns with twenty-five vessels of 5,297 tons, and Hawaii with sixty-four vessels of 37,149 tons. In the Philippines 2,340 vessels of 102,581 tons (of which 149 vessels of 43,598 tons are steam vessels) are under American protection. Until congress has so enacted the Philippine vessels are not vessels of the United States.

Although registered American vessels increased 62,435 tons in the year, American vessels carried only 8.2 per cent of exports and imports, the smallest percentage in the history of the country. The fleet of ocean steamers in foreign trade is too small to be compared with that of foreign nations. The fleet of each of the four large British and German steamship corporations exceeds the American fleet in tonnage, mileage and business.

The tonnage built and documented in the United States in the last fiscal year comprised 1,581 vessels of 483,634 gross tons. The steel vessels under construction or under contract in the current fiscal year will much exceed similar tonnage built in any previous year. The bureau is advised of eighty-nine such merchant vessels of 355,645 gross tons, to be valued at about $36,000,000. Besides these, seventy-one naval vessels of 281,148 tons displacement are building at contract prices of $78,000,000. In this work forty-four plants, with a capital of about $68,000,000, employing about forty-six thousand men, are engaged.

The building of ten transatlantic steamers presumably rests on anticipated legislation by congress. Six for the Atlantic Transport line are building from the same plans used in building steamers in England for the same company. The American cost of a steamer of the Minnehaha type will be $1,846,800; the British cost $1,419,200. The American cost of the smaller transatlantic cargo steamers will be $729,000, for which the British price ranges from $534,000 to $486,000.

The difference in wages on American and foreign vessels is considered in detail. In illustration the payroll (excluding master) of 380 men on the St. Louis is $11,300; of 427 men on the British Oceanic is $9,900, and of 500 men on the German Kaiser Wilhelm der Grosse $7,715. The German is the fastest steamship; the American is the smallest.

The report contains a detailed statement of the foreign voyages of American vessels last year, showing that the American flag was seen much oftener on the North Atlantic during President Jefferson's Embargo (1808) or during the cruises of the Alabama than at present. Foreign shipping in the Pacific trade has doubled in three years.

The purchase of the Leyland line is considered as evidence that American capital is willing to invest in ocean steamships; that there is an advantage to American exporters in American control of ocean steamships, even if not under the American flag, and that in the coming development of ocean transportation facilities the union of trunk railroad lines and steamship corporations will be an important factor. Including the Leyland purchase, American capital owns fully 670,000 tons of steamers under foreign flags, which in actual carrying power exceed all American vessels now engaged in foreign trade. The war and navy departments also own 126,847 gross tons of foreign built transports and colliers. By various special acts, fifty-six foreign built vessels, of 132,187 gross tons, have been admitted to registry. American money, accordingly, of late years has purchased 931,000 tons of foreign built steel steamers, while since 1891 there have been built in the United States 1,006,000 tons of steel steam vessels of all kinds.

The principal foreign and American ocean mail contracts are printed in full, and it is shown that, at the present prices of steamships, British ocean mail contracts are more advantageous for steamship lines than American contracts under the act of 1891. The report contains the usual statistical tables of American shipping, and also tables illustrating the growth of British and German shipping. It will not be printed for distribution until December.

The following letter, recently addressed to the commissioner of navigation by B. N. Baker of Baltimore, president and principal owner of the Atlantic Transport line, shows the present difference in the cost of building ocean screw steel steamers in the United States and Great Britain:

"Referring to my letter of March 16, 1901, and replying to your request with regard to relative difference in cost of ships, our company at present have a contract for two ships with Messrs. Harland & Wolff, Ltd., Belfast (one of which will be completed very early in the spring and the other a little later, say, during the summer), of exactly the same size, dimensions and all particulars as two ships we have contracted for with the New York Ship Building Co. of Camden. The cost of the English built ship, as near as possible (we having just completed two of exactly the same size, dimensions and speed), will be about £292,000 ($1,419,120). The same identical ship, built at the works of the New York Ship Building Co., will cost us a little over £380,000 ($1,846,800). In addition to this we are building two steamers with the New York Ship Building Co., of smaller dimensions, for which we have a contract, at £150,000 each ($729,000). Also two ships of exactly the same dimensions, with the Maryland Steel Co., Sparrow's Point, for £150,000 each ($729,000). We have two ships of identically the same detail, delivered to us in the last twelve months, built by Messrs. Harland & Wolff, Belfast, one of which cost me £110,000 ($534,600), and the other £100,000 ($486,000)."

SHIP BUILDING IN SCOTLAND.

PAUSE IN DEMAND FOR MERCHANT SHIPS CAUSES INTEREST IN VESSELS OF WAR—THE 14,000-TON CRUISER KING ALFRED—OTHER NEW VESSELS.

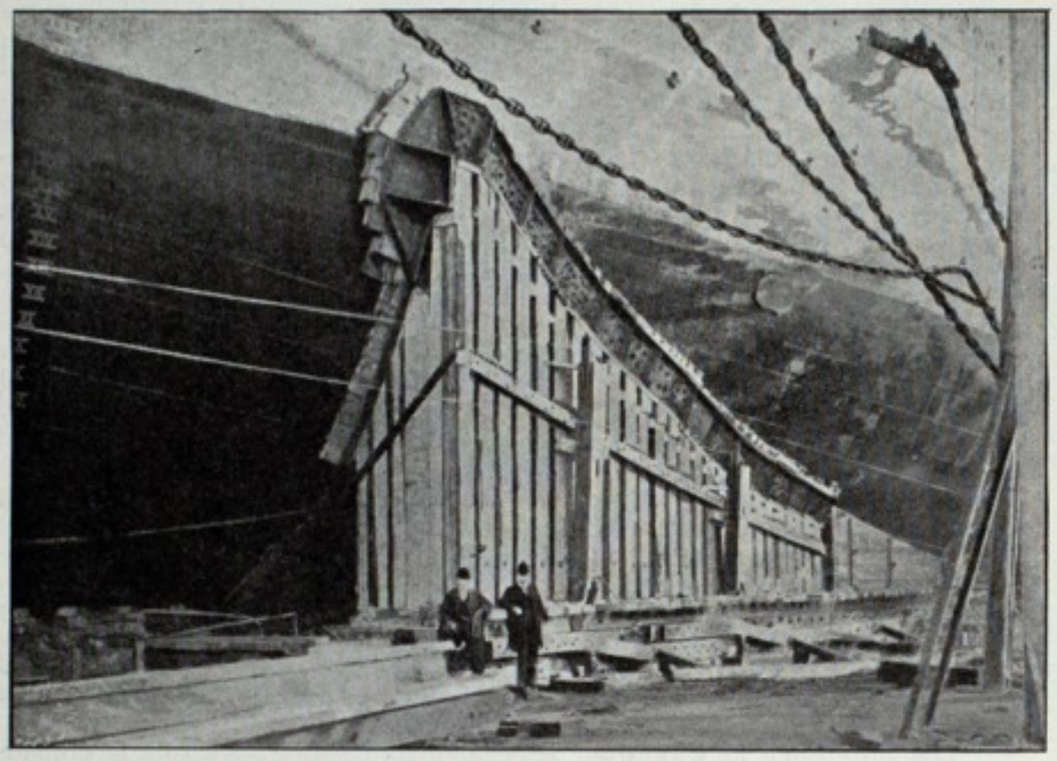
Glasgow, Scotland.—The pause in the demand for new merchant ships, consequent upon the decline in freights, to which I have already referred, naturally causes the trade to turn with interest to work, actual and prospective, for the British and foreign navies. At present there are in course of construction in private yards thirty-three war ships of 203,775 tons displacement, and according to the last admiralty program there are still three cruisers to be allotted to contractors. The next admiralty program will, it is hoped and believed, include considerably more work for private builders and a large proportion of it will, in the natural order of things, come to the Clyde. This is the cheering feature in one section of the trade (for, of course, only a select few of our builders are on the admiralty list) to relieve the gloom which will gather as merchant contracts are worked off. And meanwhile the freight market seems to get worse and worse.

Special interest attaches to the launch this week at Barrow of the armored cruiser King Alfred, the fourth of this particular type of ship ordered by the admiralty, the fiftieth war ship built at the Barrow yard, and named in commemoration of King Alfred who, just one thousand years ago, laid the foundation of the British navy and of British sea-power. This vessel, whose displacement is 14,000 tons, was launched with all her side armor, part of her bow armor, and her main-deck casemates, on. It is not often so ponderous a mass of material has been put afloat at one stroke. But it was all done in about fifty seconds, and without the suggestion of a hitch. She is one of the largest cruisers ever designed for any navy.

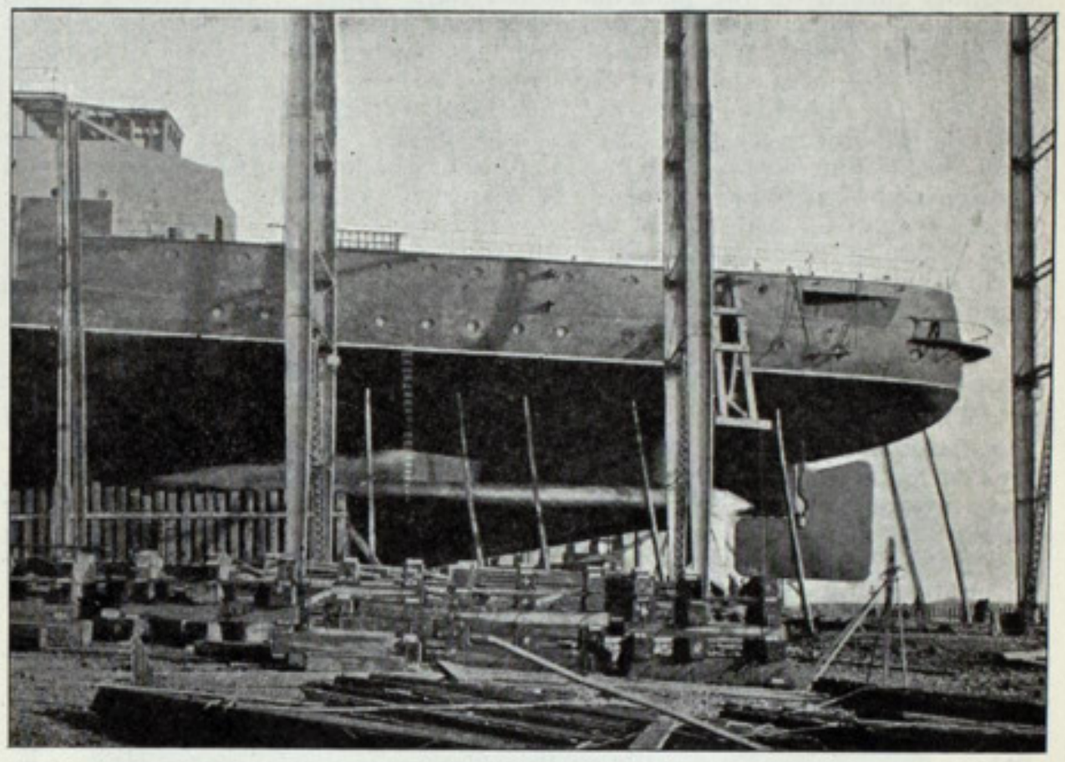
I propose now to give some detailed information about this interesting ship. She is, as I have said, the fourth of the class to be launched, and although she may not be quite so far advanced as the other cruisers of the class, she is nearer completion than the great majority of ships at the time of floating. These four ships are the largest cruisers ever designed, and although the admiralty have ordered sixteen armored cruisers somewhat less in size since the four were laid down, they have not lost appreciation of the qualities possessed by the type. There seems, indeed, every likelihood of more vessels of similar size and power being ultimately constructed because of their superiority in gun-power and protection. British ships are designed to meet specific probable competitors, and since the quartette were designed other powers have increased the size and fighting qualities of their cruisers. It is intended that our cruisers should be able, with from two or four guns, to strike blows of great power, and the 9.2-in. guns of the King Alfred, which are able to develop a muzzle energy of 17,830 foot tons, give them a great advantage over the weapons of any of the armored cruisers of foreign powers. Ships with 9.2-in. guns have become almost imperative to checkmate the recent developments of foreign powers. The larger ships have armor 6 in. instead of 4 in. thick, which constitutes a great defensive quality. Her length is 500 ft., width 71 ft., and draught 26 ft., with a displacement of 14,100 tons. The length is the same as that of the Powerful and Terrible, which the new ship resembles in general appearance. The most notable difference is the addition of four 6-in. guns, the absence of military tops on the masts, and the cutting away of the poop, which reduces the height of the after 9.2-in. guns above the water line, but produces a great economy in weight, utilized for increasing the offensive and defensive qualities of the ship. By a slight addition to the weight of the engines, the power has been increased from 25,000 to 30,000, giving an increase in speed from 22¼ to 23 knots, all without increasing the total displacement of the ship. The bunker capacity is 2,500 tons and the complement is 900 men. The machinery consists of two sets of triple-expansion engines, each with four cylinders and four cranks, balanced to reduce vibration to a minimum. The low-pressure cylinder is divided, the diameter of the two being 81½ in., while the intermediate is 71 and the high-pressure cylinder 43½ in. Piston valves are used for the high-pressure and intermediate cylinders, and slide valves for the others. The stroke of the piston is 48 in., and, running at 120 revolutions, the piston speed will be 960 ft. per minute. Some changes have been made in connection with the exhaust steam from the auxiliary engines with the view of increasing the economy. The exhaust may pass into the low-pressure receiver of the main engine for use in the low-pressure cylinder, or it may be used in the evaporators in connection with making up any loss in the feed water, or it can be passed into the auxiliary condenser or to the atmosphere. In modern cruisers the main condenser for each engine is usually divided into two equal parts so that any leakage of salt water can at once be dealt with without the whole of the condenser being shut off, and thus repairs may be effected without stopping the main engines.

The total weight of the King Alfred's machinery is about 2,500 tons, including the boilers. Thus 12 I.H.P. are developed per ton of machinery. There are forty-three boilers, varying considerably in width, the number of elements being arranged so that the boilers may fit compactly in the ship which has very fine lines. The boilers have a total heating surface of 71,970 sq. ft., and a total grate area of 2,310 sq. ft., so that 13 I.H.P. must be developed per square foot of grate, while the allowance of heating surface is 2.4 sq. ft. per horse power. The boilers are arranged in four batteries, with four funnels with a height above grate of 90 ft. The funnels are of equal size and equi-distant from each other.

A word now as to the armament, the mechanism for which has all been designed and constructed at Barrow so ingeniously that the 9.2-in.



BOW AND STERN CRADLES.



STERN VIEW—LAUNCHING VIEW.

Launch of the British armored cruiser King Alfred. (From Engineering, London.)

gun has practically been made a quick-firer. Hydraulic power has been utilized for the mounting of the gun, in preference to electricity, which, with some advantages, combines many difficulties in practice. Hydraulic machines are applied direct for elevating the gun, for running it out and in, for lifting the ammunition from the bottom of the ship, as well as for hauling the projectile from the magazine to the bottom of the lift. The engines for providing the water-power are of the compound tandem type, so designed as to obviate the necessity for an accumulator, and are provided with governors to admit of variations in speed from three to 110 revolutions per minute, with pressures of about 1,000 lbs. per square inch. Each pump can supply the power for both forward and aft mounting, and a large tank is built into the ship for storing fresh water, in which a slight admixture of soft soap and oil is included for lubricating internal surfaces. The guns are mounted on a turn-table carried on live rollers, which rotate on a base built within the barbette and "turned" to a marvellously active surface. All the gear rotates with the gun mountings, as well as the gun cradles, the hydraulic mechanism for training and elevating the gun, and recoil presses. The total moving weight which is under the control of one operator is 120 tons, of which 50 tons is due to the 6-in. armored shield protecting the gun, but as a matter of fact this weight is so absolutely balanced at its center of gravity, and is provided so adequately with anti-frictional devices, that it may be worked by hand in the event of the hydraulic power giving out. The weapon may be loaded at any position, so that once the angle and range have been determined, there is no necessity to move the gun for reloading.

Besides the two 9.2-in. guns mounted at bow and stern there are twelve 6-in. guns, which are mounted in a series of two-story casemates, four on either broadside, and these 6-in. guns have, on trial, fired eight aimed rounds per minute of a projectile of 100 lbs. weight. Four of the 6-in. guns, as well as one of the 9.2-in. weapons and two 12-pounders fire ahead in line with the keel, while the same number of guns can discharge astern, the total number of projectiles being thus 116, with an aggregate weight of 5,720 lbs. per minute ahead or astern; while the broadside fire totals 11,190 lbs., a weight of shot which is not equalled by any other type of cruiser thus far conceived. The casemates are of 6-in. steel armor, and as the distance between them is not great, the whole broadside of the ship for more than half of its length may thus be said to be armor-clad from a considerable distance below the water line to above the upper deck. The main continuous armor, which is of 6-in. hardened steel, extends for two-thirds the length of the ship, beginning about 100 ft. from the stern, and at the forward end there is an athwartship bulkhead, while 2-in. nickel steel is continued from this point right forward to the ram. This belt of 6-in. and 2-in. armor is 17 ft. deep, extending from 5 ft. below the water line to 12 ft. above it.

The committee appointed by the admiralty to consider the general question of the progress of naval work, in view of recent delays, is likely, I am told, to make some important recommendations. This committee includes men like Sir Thomas Sutherland of the Peninsular & Oriental Co., Sir Francis Evans of the Union (now the Union-Castle) line, and others thoroughly well acquainted with the methods of ship owners in their relations with ship builders. Witnesses have been examined both from private works and from the admiralty. A radical change is proposed in the correspondence department and in the system of tenders and designs from private firms. In future, ship building firms will probably be asked to submit competitive designs as well as prices. Hitherto the practice has been to design all ships at the admiralty (excepting torpedo-boat destroyers) although in the case of machinery only general particulars with standard specifications have been prepared, the engineers of the contractors being left some measure of freedom in preparing details. In the merchant service the practice is to lay down general requirements, and such limitations as length, draught, speed, capacity, displacement and coal consumption are stipulated. It is suggested that this might be tried in connection with naval work, but there are undoubtedly great tactical advantages in having certain ships forming fleets exactly similar in speed, maneuvering power and coal endurance, etc. There are, however, many classes of vessels acting separately in which there is not the same necessity for uniformity and it is with these that private firms will have the first opportunity of showing their dexterity. As to the standardization of machinery, it is urged that if parts of the machinery of similar ships are made to one form and size, so that the spare parts of one vessel may be utilized in another, the parts of such machinery must be designed by one central authority. While such an arrangement would confer great advantage when vessels were crippled in action, it would mean some reduction of freedom in design.

THORNYCROFT-SCHULZ BOILER COMBINATION—SOME NEW VESSELS.

An important phase in the water-tube boiler question has been reached by the announcement that an arrangement has been come to between the Thornycroft company and the owner of the patent rights of the Schulz water-tube boiler. There is great similarity between the two steam generators, but both have now joined forces, and the boiler is to be known in this country as the Thornycroft-Schulz and on the continent as the Schulz-Thornycroft boiler. America does not, I believe, come within the scope of the agreement. This type of steam generator is of the express pattern, with small curved tubes, and of the two designs there are now in use 907 boilers, equal to an aggregate of 1,033,950 I.H.P. This is largely made up of small vessels of the torpedo class, but there are twenty-four vessels of the battleship and cruiser class with this boiler, the power aggregating 197,000 I.H.P., of which 135,200 I.H.P. is in Germany alone. There the practice is common of fitting a part of the steam plant on the water-tube principle, and the remainder in cylindrical boilers, and the Schulz generator has in this arrangement proved satisfactory. But the tendency is to increase the proportion of water-tube boilers in each ship. Thus, beginning with 35 per cent. of water-tube boilers to 65 per cent. of cylindrical, the Germans have now gone up to 60 per cent. of tubulous generators. Germany is now considering the fitting of 51,000 I.H.P. of the Schulz-Thornycroft boiler.

The annual report and balance sheet, just issued, of the Fairfield Ship Building & Engineering Co., Glasgow, shows that a dividend of 8 per cent. is recommended for the past year, carrying forward a balance of £2,040 after setting aside £25,000 for depreciation on buildingings and machinery and £5,746 for depreciation on shipping property, and transferring £10,000 to reserve fund. This is not a bad showing, considering the high cost of steel material, copper, coal, and wages during nearly the whole of the period covered by the accounts.

In a recent letter I gave particulars of the sale of the City line of steamers to Mr. J. R. Ellerman of the late Leyland line, and also something of the history of this old Glasgow enterprise. I have now to report the addition of a new liner to the reconstructed City line, from the yard of Messrs. Workman, Clark & Co., Belfast. The City of Benares, as she is named, is the largest vessel of the City line and the first vessel built since the line was taken over by Mr. Ellerman. She is intended for the Glasgow, Liverpool and Calcutta trade, and has been built under the special survey of the British Corporation of Shipping, Glasgow, to their highest class. She has also a board of trade passenger certificate as a first-class passenger steamer. The principal dimensions of the vessel are: Length, 460 ft.; breadth, 55 ft.; depth moulded, 34 ft. There are two complete steel decks, with a poop, long bridge and topgallant forecastle deck. The bottom of the vessel is constructed on the cellular system for carrying water ballast. The six holds are kept unobstructed for cargo by the adoption of deep girder framing and heavy fore-and-aft girders below deck. For discharging cargo four powerful steam winches and derricks are provided at each of the two main hatches, four of these derricks being suspended from crane posts, which also act as ventilators. The remainder are stepped on derrick tables attached to the masts. For working the bridge space there are two hatches, with two winches and derricks to each hatch, and for the poop space there is one hatch with two winches and two derricks, all these derricks being swung from crane posts. There are in all sixteen winches provided for working the cargo. Passenger accommodation is provided in large steel deck houses on the bridge deck with the saloon in the center of the forward house, and there is ample bath and lavatory accommodation for a full complement of passengers. A fine smoking room with bar attached is situated at the fore end of the casing convenient to the saloon. A handsome music room is fitted above the saloon house, with a fine open stairway down to the saloon. Abaft of the saloon is the serving pantry, which is a large apartment, and on the same deck, aft of the funnel, is the galley and bakery, both of which are of ample size for the requirements of passenger accommodation. The crew are berthed aft, under the poop deck, and under the after part of the bridge are placed the petty officers. The various engines for navigating the vessel are of the most modern and approved construction, and the various outfits are of the most complete character. A complete installation of electric light will be introduced throughout, including cargo lamps, mast and side lights. The machinery consists of high-power triple-expansion engines, and steam is supplied from two double-ended steam boilers with a separate boiler for the auxiliary machinery.

A large cargo carrier of the tramp order has just been launched by Messrs. William Hamilton & Co., Port Glasgow, from their Glen yard, namely, the steel screw steamer Inveric, which registers 4,700 tons gross and has a deadweight carrying capacity of 7,200 tons. Her dimensions are: Length, 370 ft.; breadth, 52 ft.; depth, 30 ft. Messrs. David Rowan & Co., Glasgow, supply the machinery.

There is a distinct pause in the demand for new cargo tramps, although our building yards continue full of work.

AROUND THE GREAT LAKES.

Capt. L. M. Edwards has sold the steamer Geo. Dunbar to the Saginaw Bay Lumber Co.

Mr. E. T. Root has been appointed local manager of the Great Lakes Towing Co. at Port Huron.

Directors of the Great Lakes Towing Co. have declared the regular quarterly dividend of 1¾ per cent. on the preferred stock, payable Nov. 20.

Capt. York of Peoria, Ill., has let a contract to Burger & Burger of Manitowoc, Wis., for a 60-ft. wooden river steamer, to ply on the Illinois river. The boat will be built this winter.

The launch of the steamer Frank M. Osborne, building for J. C. Gilchrist and others at the Cleveland yard of the American Ship Building Co., will take place on Saturday of this week.

In six days ending at noon on Saturday last Milwaukee coal concerns received twenty-three cargoes of coal, aggregating 61,000 tons. The largest was that of the steamer Frank H. Peavey, 6,536 tons.

Officials of the International Longshoremen's Association will meet with managers of Lake Erie ore and coal docks in Cleveland Dec. 2 to fix wages of men employed upon the docks during the winter period.

It is reported from Detroit that the Pere Marquette railroad company, which already has in operation on Lake Michigan two large steel car ferries, contemplates the construction of another vessel, to cost about $400,000.

It has been decided to close the New York state canals on Nov. 30, and formal notice to this effect will be sent out within a few days by John N. Partridge of the New York state department of public works. The canals this year have done a very profitable business.

Although not making a great record in number of trips between Buffalo and Portage, the copper district of Lake Superior, the steamer Flagg, operated from the office of M. A. Hanna & Co., has twelve very valuable cargoes to her credit. She has moved in all about $10,000,000 worth of copper.

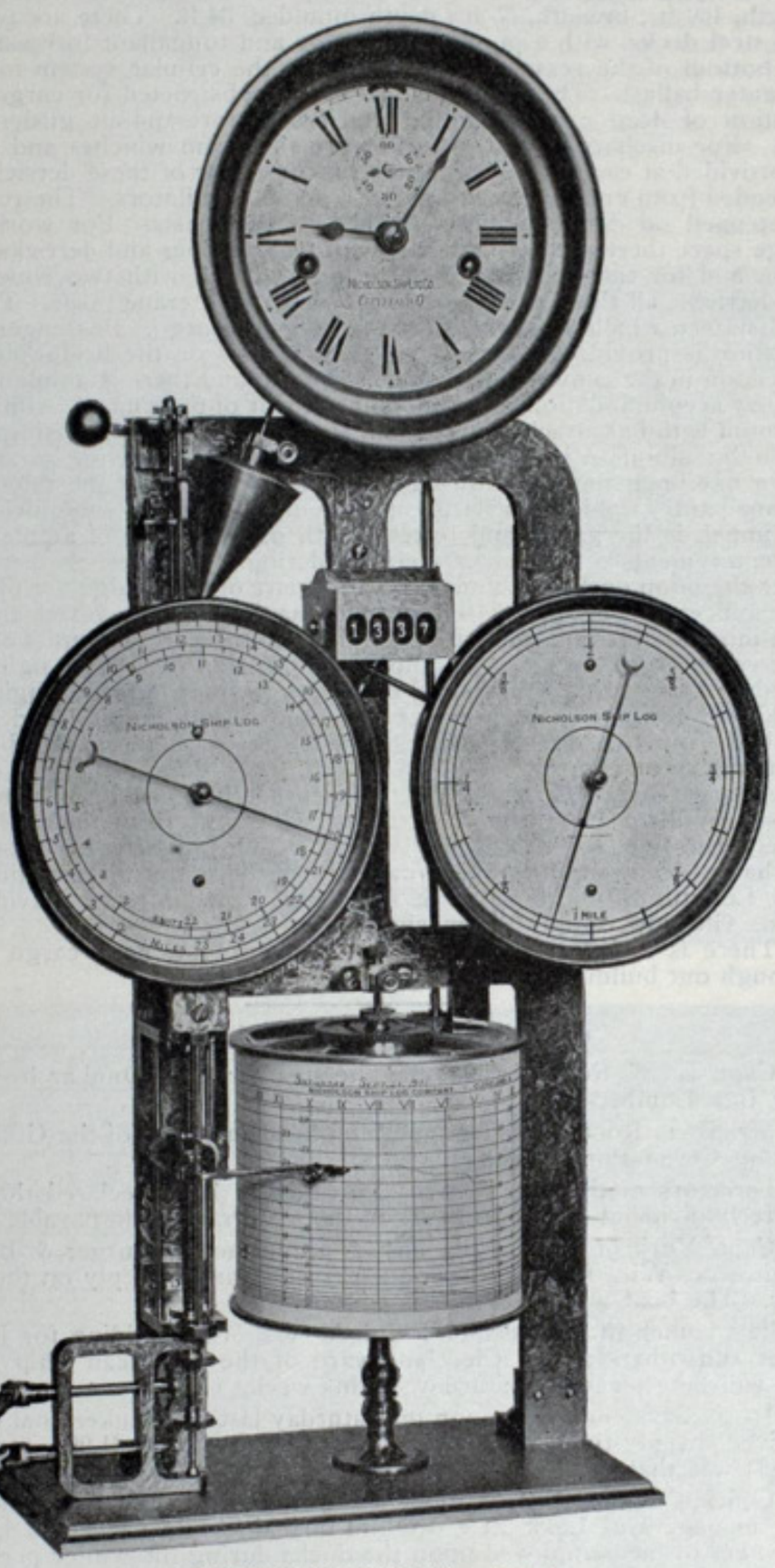
Extensive improvements in the terminal facilities of the Western Transit line, the lake line of the New York Central railroad, will be made during the coming winter at Buffalo and be completed by the opening of navigation. Its grain handling capacity will be increased 100 per cent. and the package freight 50 per cent., as compared with present facilities.

Messrs. Bottsford, Jenks and Duncan, who are planning the establishment of a ship yard at St. Clair, Mich., for the construction of steel vessels to be operated between the head of Lake Superior and Port Huron in connection with the Grand Trunk railway, have organized a company with a capital of $100,000 and have adopted the name Columbia Iron Works.

The Champion Rivet Co., Cleveland, O., has issued a new telegraphic code, adapted from the Western Union telegraph code (universal edition) for the convenience of its customers. The cover is illuminated with a picture of the Algiers floating dry dock, and the locomotive Bessemer, the largest in the world, both of which are riveted with Champion rivets.

THE NICHOLSON SHIP LOG.

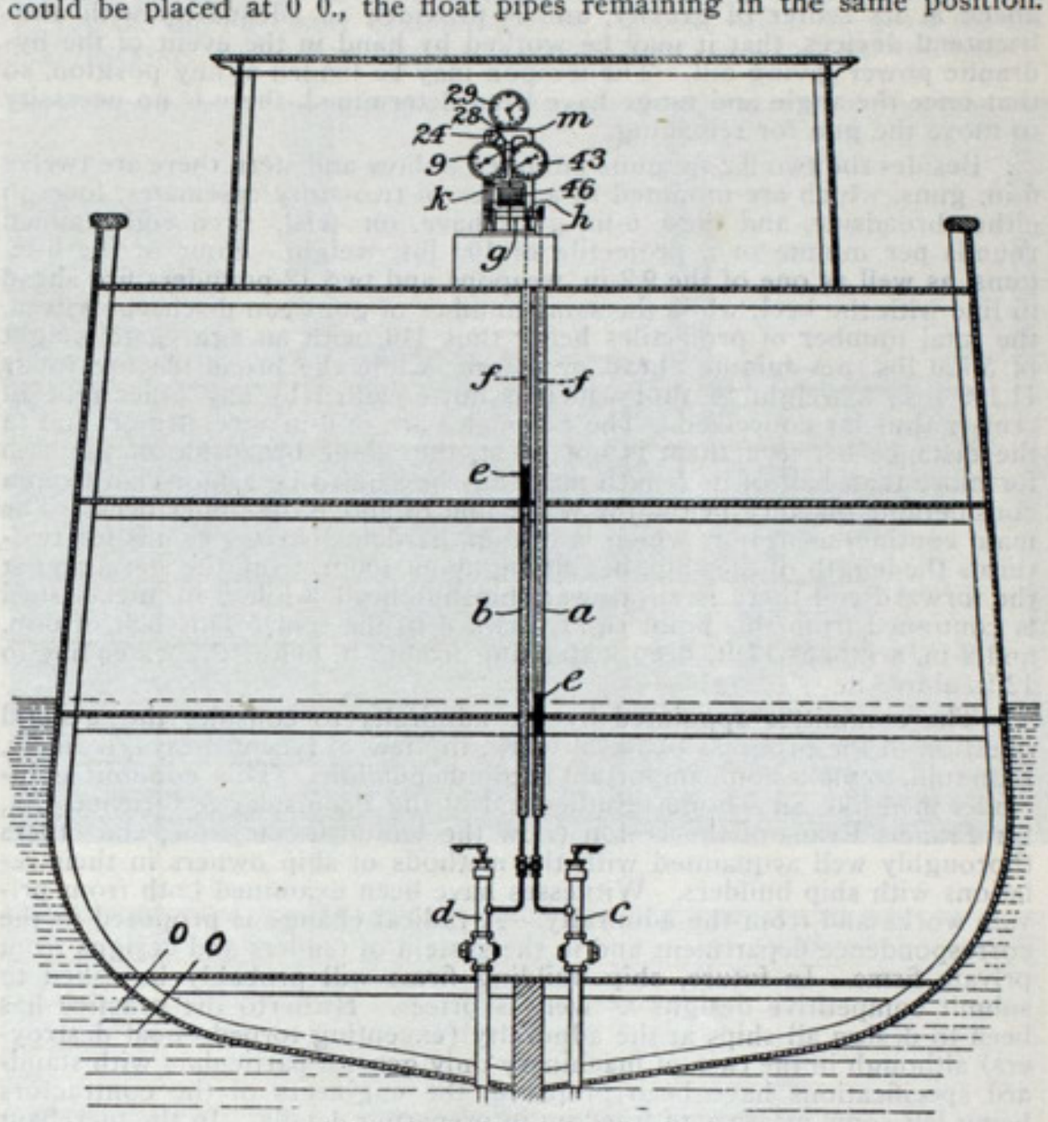
The Nicholson Ship Log Co., 204 Superior street, Cleveland, O., has just issued a catalogue descriptive of its perfected ship log. This log was used in the famous race between the City of Erie and the Tashmoo on Lake Erie, June 4 last, and was both accurate and satisfactory in its workings. During this race the log varied only 17-100 of a mile from the government survey in the measurement of the distance. The slight difference is accounted for in the steering of the ship and shows that the course of the City of Erie was most accurately steered. A ship log, speed and recording mechanism, that can be relied upon to determine accurately a vessel's location in foggy or stormy weather, when observations cannot be ob-



NICHOLSON SHIP LOG. Fig. 1.

tained, is something that has long been looked forward to by mariners. The main requirements of such a log are reliability and accuracy. It must be good for a long term of years with need of but few repairs. Years of experiment and gradual development along lines which experience has proved correct has led to the present type of the Nicholson ship log. It automatically indicates the speed of a vessel, in miles or knots, per hour, on a dial, and registers the same on a counter, also on a paper record chart with the day of the week and hour of the day, thus keeping a perfect record which shows momentarily every variation of speed, whether going or at rest. The log is enclosed in a case, with plate-glass front and sides, which is 31 in. high, 19 in. wide and 9 in. deep and can be placed in the pilot house, captain's cabin, engine room or main saloon. It is well adapted for use on steamships, sailing vessels or yachts and it is not liable to get out of order. The principle followed by nearly all inventors of nautical measuring devices is that of towing a heavy float or propelling wheel on a line, in some cases as long as 450 ft. This line requires immediate attention when the ship stops or it is in great danger of being lost with its attachments. Every time the ship starts the line must be cast overboard, care being taken that it does not foul the wheel. Heavy seas and driftwood also interfere with the accuracy of this class of log. With the Nicholson log all these difficulties are overcome, inasmuch as there is nothing to affect its reliability, as the water will always act the same in the float pipes, notwithstanding the weather or the conditions of the surface of the sea. When the ship starts or stops no attention need be paid to this log as it operates entirely automatically. Very little attention is required except to wind the clock and change the paper record once a day.

The clock, an excellent idea of the appearance of which may be obtained from cut No. 1, works in conjunction with the indicator and regulates the counter and record drum. The pointer on the dial to the left is operated by the speed of the vessel and indicates the miles or knots per hour that the vessel is moving through the water at the time it is observed. It is so sensitive that it shows instantly the slightest variation in speed. The pointer on the dial to the right completes a revolution with every mile or knot traveled and shows the fractions of miles. The counter is placed between the dials and registers the number of miles or knots. The drum on which the paper record is placed shows a complete record for 24 hours of the vessel's run, the hours being laid off vertically and the miles horizontally. Cut No. 2 shows the arrangement of pipes in a vessel; (d) represents the intake tube. As the ship moves forward the water enters the tube (d) and flows into float pipe (b) which is a 3-in. brass tube, raising a float (e) according to the speed of the vessel; the float (e) is connected by a wire (f) which runs over a wheel (g) and is attached to a counter weight, thereby furnishing the power to operate speed-dial (9). The counter weight is guided by a ¾-in. pipe. The intake tube (c) maintains the load line of the vessel, the float operates in a similar manner to the one above described and is connected to the wheel (h). This prevents the speed dial from acting when loading or unloading or when the vessel rolls or pitches. For vessels operating in shallow water the intake tubes could be placed at 0 0., the float pipes remaining in the same position.



NICHOLSON SHIP LOG. Fig. 2.

The intake tubes can be raised to be cleaned, or in case of shallow water, if they become injured by striking an obstruction, the handle can be removed, the tube pushed out and another inserted.

Cut No. 3 is a photographic reproduction of the chart made by the log on the steamer City of Erie during her famous race with the Tashmoo. At 8.45 a. m. the Erie left the dock for the stake boat. The run may be followed by the dotted line on the chart, reaching 18½ miles. Arriving at the stake boat the Erie stopped the dots on the chart dropping to the zero line. At about 9:40, the gun being fired, the ship got under way, acquiring in a very short time a speed of 21¼ miles per hour, which was held for about 1¼ hours, when shoal water was encountered, checking the speed perceptibly. At 11 a. m. after passing into deeper water the speed was gradually increased until a maximum of 22 7-32 knots was attained. This was held practically until the finish line was crossed. The balance of the chart is the journey back to Cleveland.

Estimates for furnishing and attaching the log to vessels will be given by the company upon application. Correspondents should give the dimensions and state whether the vessel is constructed of wood or steel and give maximum speed attained by her. They should also designate the place or places preferred for location of log. A blue print section of the vessel would aid in estimating the cost of the installation.

NEW PUMPING PLANT AT NEW YORK NAVY YARD.

Experts of the department of yards and docks at the New York navy yard were working on the final plans for the proposed dry dock No. 4 preparatory to sending them to Washington. The newest feature of the dock will be the system of pumping. The pumping plant will be located in the caisson and will be run by electricity. The power will be furnished by the electric plant located some distance from the dock and the only connections will be by wire. The caisson will work on a hinge plan and will not be as free as other caissons are. It will simply swing to one side and the opening will be large enough for any vessel to enter the dry dock. The pumping plant will be located in the bottom of the caisson. The wire connection will be long enough to easily admit of the moving of the caisson, which will be 90 ft. long, 18 ft. wide and 30 ft. deep. Lieut. Goodrich is responsible for the introduction of this method. Besides being more efficient the plant is said to be a great saving to the government.

The Atlantic Works, Incorporated, of Philadelphia recently shipped to the Burlee Dry Dock Co., Port Richmond, Staten island, N. Y., one of their large moulding machines and a large saw table carrying a 24-in. rip saw.

ANNUAL REPORT OF REAR ADMIRAL R. B. BRADFORD.

For the first time since he has been chief of the bureau of equipment Rear Admiral R. B. Bradford fails to discuss in his annual report to the secretary of the navy the strategical advantage to the United States of securing naval coaling stations at a number of places throughout the world. Admiral Bradford gives a hint, however, that something is going on to carry out his well-known policy, for he said in the brief paragraph devoted to the subject:

"As the department is aware, efforts are being made to establish naval coal depots at important localities which it is deemed unwise to discuss in a report of a public character."

That those localities are in foreign countries is well indicated by the fact that Admiral Bradford does not hesitate to tell of the efforts made toward establishing coaling stations within the limits of this country and its possessions beyond the seas.

Work is well under way on the naval stations at Honolulu and Tutuila, Samoa. At Pearl Harbor, Hawaii, work has not been begun, owing to difficulties in the way of acquiring a suitable site. The harbor of San Luis d'Apra, Guam, is being improved and the equipment bureau is ready to proceed with the construction there of "an adequate coal depot, based upon a comprehensive scheme, suitable for a harbor for mercantile and naval purposes, well located for protection against destructive storms, and fortified against possible enemies."

A number of naval coaling stations have been and are to be established in the Philippines. The most important of these is at Olongapo, on Subig bay, where the Spaniards had done considerable fortification work. It was here that Admiral Dewey expected to meet the Spanish squadron which he destroyed in Manila bay. A coaling station has been established at Sangley Point, near Cavite, and a coal storage plant, with a capacity of 45,000 tons, is to be built there. Efforts have been made, so far without success, to obtain a suitable site for a coal depot at Cebu, and coal depots have been established at Port Isabella, on Basilan island, and Polloc, on the island of Mindanao. A new United States coal depot is being built at Yokohama, Japan. Work has been completed on the coal depot at Pichelinque bay, Mexico.

Referring to the fact that all that has been done at San Juan, Porto Rico, was the establishment of a pier for use in landing coal and other stores, Admiral Bradford says: "It is much to be regretted that little progress has been made in securing sites for other coal depots in the West Indies. It is particularly essential that some of the deep water ports of Cuba should be made available for this purpose. The entire waters surrounding Cuba are most important in a strategic sense, and supplies of coal should be near at hand."

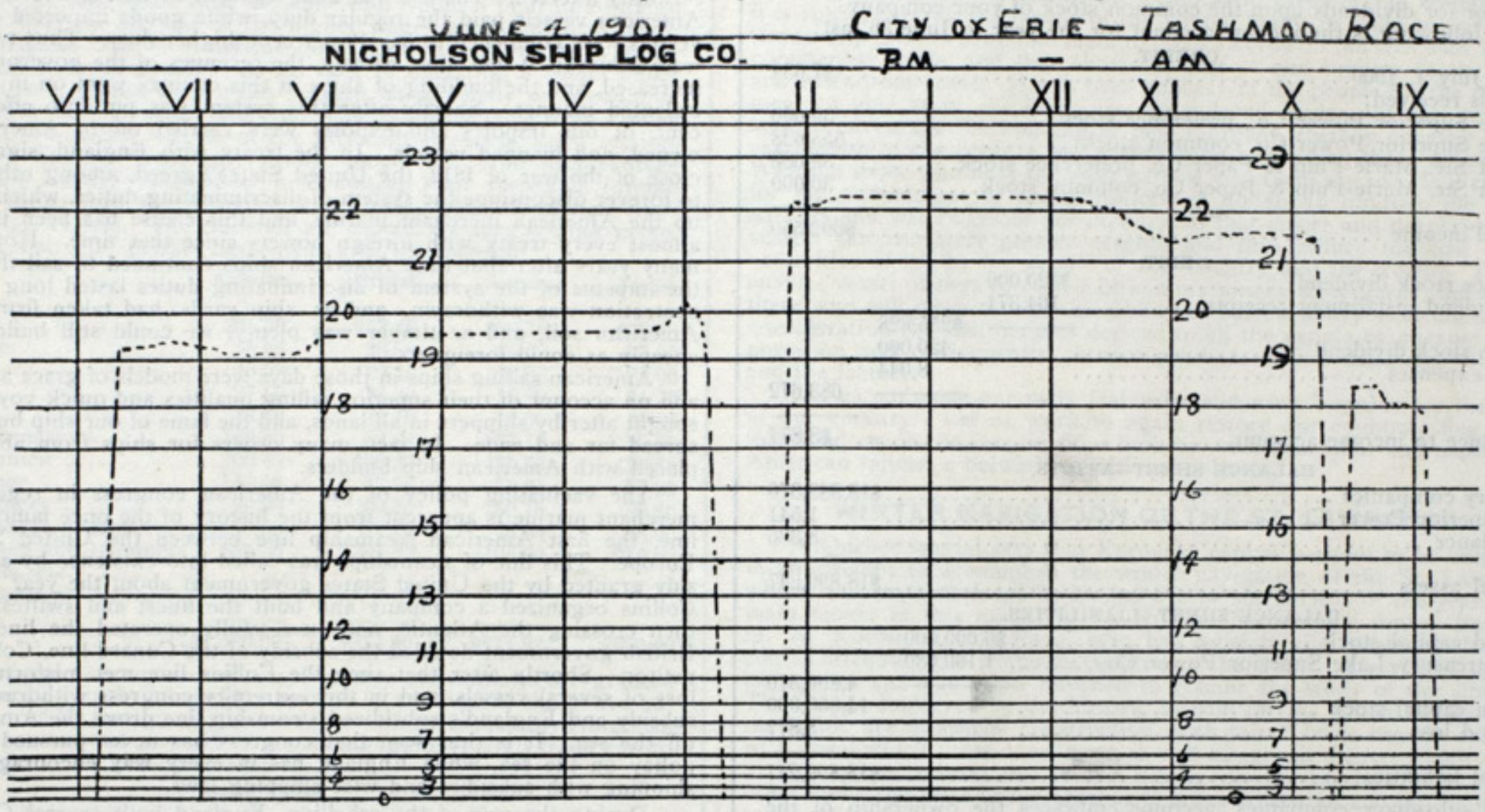
Arrangements have been made, and in some cases work has begun, for the establishment of coal depots at Frenchman's bay, Me., considered an excellent strategical site; Portsmouth, N. H.; Boston, Narragansett bay, R. I., another place selected on account of its strategical advantages; New London, Conn.; the New York navy yard, League island, Pa.; Washington, D. C.; Norfolk, Va.; Port Royal, S. C.; Key West and Dry Tortugas, Fla., both regarded as important strategically; Pensacola, Fla.; Algiers, La.; Dutch Harbor, Alaska; Sitka, Alaska; Bremerton, Wash.; Mare island, Cal.; Mission Rock, San Francisco bay, and San Diego, Cal. From the above showing it will be seen that the past year, the period covered by the report, has been one of activity on Admiral Bradford's part, and that he has been alive to the knowledge that the United States, as a world power, must be prepared for any emergency requiring the active employment of the fleet.

The Western Gas Engine Co., Mishawaka, Ind., has issued a very pretty poster regarding gas launches. The poster represents two young women speeding up a river in a launch entitled Sylva—most appropriately named, as the scene is quite sylvan. The poster is a most harmonious arrangement of color and cannot fail to attract attention wherever it is shown.

COSTLY NAVAL BASE IN THE PHILIPPINES.

Rear Admiral Henry C. Taylor, the coming chief of the navigation bureau, in a report submitted to the navy department upon the establishing of an immense naval station in the Philippines, estimates that the project will cost the government $30,000,000. Consideration of the plans for the largest naval station in all Asiatic waters has been given by a special board at New York of which Admiral Taylor is president. The board urgently points out the necessity of a station in the new possessions equaling in all facilities for work on war vessels the great navy yards at New York and Norfolk, with dry docks. Machine shops and a plant not only possible of affording all varieties of overhauling to ships, but equal to the construction of naval vessels, if the material can be readily supplied. In the estimate of $30,000,000 is included the amount that would be required to defend the new station against sea attack. This amount would approximate $12,000,000, the board reports, and perhaps a higher figure. The establishment of the station proper is placed at $19,359,500, exclusive of a coaling station, hospital, magazine and other dependencies of a well-established station. These features the board states will cost at least $10,000,000, and perhaps $20,000,000, if the plant is to be especially elaborate.

One of the important provisions contained in the report is the establishment of a native village at the new station for the workmen who will be employed at the yard. This village, the board proposes, shall be under control of the naval authorities, as otherwise the board believes it would be dangerous to leave the inhabitants to themselves with their natural disregard of hygiene. The Olongape station will be unique in many respects. Its isolation requires special provision for storage of material for the skilled workmen who must be brought from the United States. Take it all and all, the Olongape dock yard and war base will be the most costly of all the naval institutions. The board notes that, although self-dependence is a necessity for a naval station in the Philippines, the archipelago itself produces little with which to supply the essential needs of such a station. Six million dollars will be asked of Congress this session with which to begin work on the station. Several years will be required to complete it.



NICHOLSON SHIP LOG. Fig. 3.

ANNUAL REPORT LIGHTHOUSE BOARD.

The annual report of the lighthouse board has just been issued. Authority to construct five new lightships and several lighthouse tenders is asked. The report says that while the board does not propose either to gather or disseminate marine news, it is desirous, in the interests of commerce and navigation, as well as of economy to be put into early and quick communication with its outlying lightships and lighthouses and it is for this purpose alone that it asks an appropriation to enable it to install a wireless system of telegraphy between such points in the lighthouse establishment as shall seem to be most necessary. At the end of the fiscal year there were under the control of the lighthouse board the following aids to navigation:

Lighthouses and beacon lights, 1,306; light vessels in position, forty-five; light vessels for relief, eight; electric lighted buoys in position, eleven; gas lighted buoys in position, ninety-one; fog signals operated by steam, caloric or oil engines, 179; fog signals operated by clockwork, 222; post lights, 1,827; day or unlighted beacons, 752; whistling buoys in position, seventy-seven; bell buoys in position, 122; other buoys in position, including pile buoys and stakes in fifth district and buoys in Alaskan waters, 4,780. In the construction, care and maintenance of these aids to navigation there were employed: Steam tenders, thirty-four; steam launches, eleven; sailing tenders, two; lightkeepers, 1,420; other employes, including crews of light-ships and tenders, 1,428; laborers in charge of post lights, 1,574. The board asks for an appropriation of $90,000 to reconstruct a buoyage system and man the lighthouses of Porto Rico, and $25,000 for the maintenance of the Hawaiian system. The board also asks for other appropriations, as follows: Supplies for lighthouses, $502,886; improvements at lighthouses, $750,000; salaries of lightkeepers, fuel, rent, etc., $883,000; expenses of light vessels, $525,000; expenses of fog signals, $190,000; lighting of rivers, $330,000.

ANNUAL REPORT OF THE CLERGUE ENTERPRISES.

The annual report of the Consolidated Lake Superior Co., which controls the extensive mining, steel-making, railway, paper manufacturing and other enterprises in the Canadian Sault Ste. Marie district, being carried through by what is known as the Clergue syndicate, refers to the past year as an eventful one. The absorption of the Ontario Lake Superior Co. gave the consolidated company control of the Algoma Central railway and steamship companies; the Manitoulin & North Shore Railway; the Algoma Commercial Co.; the British-American Express Co., and the Algoma Central Telegraph lines. The operating companies owned by the company are: The Lake Superior Power Co., Sault Ste. Marie Pulp & Paper Co., Tagona Water & Light Co., Michigan Lake Superior Power Co., and the Algoma Steel Co., Ltd., just organized. On October 31 there was outstanding of the preferred stock $14,475,800. During the year ending June 30, 1902, there will be outstanding an average not exceeding $18,000,000, upon which the dividends for the year amount to $1,260,000.

The directors say: "The amount of net earnings which will be realized from June 30, 1901, to June 30, 1902, upon the sale and transportation of iron ore from the Helen iron mine, will alone be sufficient to pay the entire preferred stock dividend of the company during the period named. This statement is based upon earnings now being realized, without considering the increased value which will result from mixing the Helen ore with the high-grade Bessemer ore from the Josephine mine. The large earnings, therefore, which will certainly be derived during the same period of time from the steel works, government bonus, ground wood and sulphite-pulp mills, ferro-nickel works, sulphuric-acid works, water-power rentals, railway and steamship operations, timber sales, and the sales of ore from other than the Helen mine, will all be tributary either to surplus account or for dividends upon the common stock of your company."

The following is the income account for the year to June 30 last:

CREDIT.

Balance July 1, 1900	$7,634
Dividends received:	
Lake Superior Power Co., preference stock	39,600
Lake Superior Power Co. common stock	555,628
Sault Ste. Marie Pulp & Paper Co. preference stock	59,688
Sault Ste. Marie Pulp & Paper Co. common stock	30,000
Total income	$692,550

DEBIT.

Preference stock dividend	$420,000	
Less dividend installment receipts	164,371	
		$255,628
Common stock dividend		420,000
General expenses		8,044
		683,672
Balance to income account		$8,877

BALANCE SHEET—ASSETS.

Subsidiary companies		$18,889,370
Lake Superior Power Co		1,541
Cash balance		8,336
Total assets		$18,899,247

BALANCE SHEET—LIABILITIES.

Preferred capital stock	$6,000,000	
Less in treasury Lake Superior Power Co	1,109,630	
		4,890,370
Common capital stock		14,000,000
Profit and loss		8,877
Total liabilities		$18,899,247

The subsidiary companies' account embraces the ownership of the Sault Ste. Marie Pulp & Paper Co., the Lake Superior Power Co., the Michigan Lake Superior Power Co., and Tagona Water & Light Co.

CRUISER CINCINNATI TO HAVE A FIGUREHEAD.

The cruiser Cincinnati is the first all-steel ship of the service to have a figurehead and when she is placed in commission at the New York navy yard on Dec. 1, she will display a life-size heroic figure of liberty in steel and wood, standing straight out from her well-curved stem. This figure was designed and constructed at the New York yard under direction of Rear Admiral Francis T. Bowles, then in charge of the construction workshops, and is declared to be a perfect specimen of the figurehead for a warship. Such decorations disappeared with the gradual abandonment of wood for steel vessels and even with many of the old wooden craft there were few of those immense figureheads which years ago were a distinguishing feature of all American naval vessels. The last of this number to display figureheads were the vessels of the line of battleships class that found their way to the burial ground of the navy soon after the civil war. The Cincinnati is said to be the only all-steel vessel in the world of any naval power whose stem is adorned with a figurehead. In another respect the Cincinnati is unique among vessels of the navy and is more nearly absolutely fireproof than any other warship afloat. Every article of her furniture and interior equipment is of metal, her bulkheads are of steel, and wire and metal generally have been adopted throughout the vessel where wood has heretofore been used. Water-tube boilers have been placed in the ship and the enlargment of her coal bunkers will increase her steaming radius of action one-fourth greater than it was before. She has also been made more economical to maintain in commission and by Admiral Bowles is regarded as practically an entirely new vessel.

A huge sternpost for the American line steamship New York has arrived at the yard of the John N. Robins Co., Erie basin, New York. It is a steel casting in two parts. The lower one is a massive and complicated piece of work, weighing 15 tons. The work of cutting away the stern of the vessel will be finished this week and the reconstruction of the ship will be commenced. About 140 ft. will then have been removed on the keel line, including the plates, tanks, frames, floors and bulkheads. This work is irrespective of the removal of the ballast tanks for a distance of 325 ft.

RESTORATION OF THE AMERICAN MERCHANT MARINE.

BY RICHARD P. JOY.

The deplorable condition of the American merchant marine in over-sea trade has long called for national measures of relief. The condition that confronts the people of the United States is that they are now paying, as a nation, over $200,000,000 annually to foreigners for transporting passengers and freight between the United States and foreign countries. All of this vast sum goes out of the country, and the amount is indeed appalling. Senator Gallinger recently stated in the United States senate that "at the present time barely 4 per cent. of the steamship tonnage which enters and clears at ports of the United States in trade with Europe is under the American flag." The reports of the commissioner of navigation show that American tonnage of all classes engaged in over-sea trade has fallen from 71 per cent. of the total tonnage entered and cleared at the ports of the United States in 1856, to 8 per cent. in 1901, the smallest in our history, showing that our deep-sea shipping, which was one of the glories of the early days of the republic, has practically vanished.

EARLY HISTORY OF THE MERCHANT MARINE.

In order to fully understand the reasons for the decline of American shipping on the seas, a short review of the history of the American merchant marine is necessary. One of the first acts of congress under the administration of the great and wise Washington was to put into effect a system of discriminating duties highly favorable to American vessels, that is, goods imported in American ships were permitted to enter the United States under 10 per cent. less duty than goods imported in foreign vessels. This policy stimulated the upbuilding of the merchant marine to such an extent that the revenues of the government were seriously affected. The act was then changed so that goods imported in American vessels paid the regular duty, while goods imported in foreign vessels were compelled to pay 10 per cent. higher duty. Thus two objects were achieved at one time, namely, the revenues of the government were increased, and the building of ships in this country went on in an unprecedented manner. Shortly after this system was put into effect 90 per cent. of our imports and exports were carried on in American-built, owned, and manned vessels. In the treaty with England, signed at the close of the war of 1812, the United States agreed, among other things, to forever discontinue the system of discriminating duties, which had built up the American merchant marine, and this clause has been inserted in almost every treaty with foreign powers since that time. However, for many years after that time American ships continued to sail the seas, as the impetus of the system of discriminating duties lasted long after that protection was withdrawn, and as ship yards had taken firm root on American soil, and as timber was plenty, we could still build ships as cheaply as could foreigners.

American sailing ships in those days were models of grace and beauty, and on account of their superior sailing qualities and quick voyages were sought after by shippers in all lands, and the fame of our ship builders was spread far and wide. In fact, many orders for ships from abroad were placed with American ship builders.

The vacillating policy of the American congress in regard to the merchant marine is apparent from the history of the once famous Collins line, the first American steamship line between the United States and Europe. This line of steamships was called into existence by a mail subsidy granted by the United States government about the year 1846. Mr. Collins organized a company and built the finest and swiftest steamers then crossing the Atlantic, and successfully operated the line until the British government doubled the subsidy of the Cunard line, Collins' competitor. Shortly after that time the Collins line met misfortune in the loss of several vessels, and in this extremity congress withdrew the mail subsidy and England's subsidized steamship line drove the American line off the sea. It is thus seen that congress has never pursued any fixed policy on the sea, while England has in every way encouraged British shipping with subsidies and wise shipping laws.

During the war of the rebellion, England built several Confederate cruisers of the Alabama class, and these commerce destroyers were turned loose upon United States shipping, capturing and destroying thousands of tons of shipping, and forcing American ship owners to either let their vessels remain in port and rot or sell them abroad to foreigners, to be sailed under the protection of a foreign flag, which many of our ship owners were compelled to do. From this wholesale slaughter the American merchant marine never recovered, and as the change from wood to iron ships was soon felt, England on account of being able to construct iron ships more cheaply than could Americans, having the advantage of cheap iron and low wages, in addition to the policy of encouraging shipping by subsidies, soon distanced us in the race, and Americans were compelled to abandon the sea.

POLICY OF FOREIGN NATIONS IN REGARD TO SHIPPING.

England, by encouraging steamship lines with subsidies, has built up British ship yards so that by competition between those ship yards the cost of building vessels has been greatly lowered, and ships of all classes are turned out annually by the hundreds.

Government statistics show that the following nations pay annually in subsidies, mail pay, naval reserve subventions and bounties, as follows:

England	$5,274,257
Germany	1,885,880
France	6,885,248
Spain	1,904,968
Italy	1,941,000
Russia	1,211,000
Japan	3,786,000

The United States government paid to American vessels for transporting mails about $1,000,000 during the last year. However, this mail subsidy is entirely inadequate, and but few vessels have been built to operate under the provisions of this act.

UNITED STATES AIDING FOREIGN STEAMSHIP LINES.

A peculiar fact is that while the English and other foreign governments have seen fit to grant subsidies and naval reserve subventions to their shipping, with the purpose of having armed transports and cruisers in time of war, the American congress has also aided these foreign governments by paying during the past five years, in mail pay, to the Cunard

line $730,000 and to the North German Lloyd $580,000, not to mention numerous payments to other foreign steamship lines. Thus it will be seen that congress actually aids foreigners to keep up their semi-military establishments by contributions from American taxpayers. Surely it would be a far wiser policy to enact suitable legislation so that we could carry our own mails, freight and passengers, and also have the ships and crews to fall back upon in time of war, to say nothing of the advantage of paying Americans for transportation and keeping the money in the pockets of our own people.

There are two separate and distinct services rendered by the American merchant marine—the over-sea trade, which must be performed by staunch seagoing steam and sail vessels and the coastwise trade. The over-sea service of our shipping has now reached the last stage of decay, and deep-sea ships carrying the American flag are almost unknown on the seas. On the other hand, our coastwise shipping, from one port to another port in the United States and on the great lakes, is in a most flourishing condition, having received the benefits of absolute protection from the foundation of the government, as our laws prohibit absolutely any foreign-built vessel sailing under a foreign flag from engaging in the American coastwise trade. This wise policy, coupled with the sound practice of the government in ordering war ships from private ship yards, has kept our ship yards alive. If the volume of business of our ship yards could be increased, the cost of ships would be greatly lowered, and we would soon be able to build vessels as cheaply as they can be built abroad.

DISADVANTAGES AMERICANS LABOR UNDER.

At the present time the difference in cost of building ships between foreign ship yards and American ship yards is from 10 to 20 per cent. in favor of foreign yards; that is, a ship built in the United States would cost from 10 to 20 per cent. more than the same ship would if built in a foreign ship yard, mainly on account of the higher wages paid American labor. The high original cost of American-built ships is not the only disadvantage Americans labor under, as the cost of operating a vessel under our flag is much greater than under foreign flags, chiefly on account of the high wages paid American seamen. The following table from United States senate document No. 60, of the fifty-fifth congress, third session, presented by Senator Gallinger, shows conclusively the disadvantage American ship owners labor under in operating their vessels in foreign trade, as it shows how much higher wages are paid in American ships than in foreign vessels. The statistics for captain's wages are not given, that being a matter of private agreement with the owners:

Crew.	American.	British.	German.	French
Master	.....	.....	.....	.....
First mate	$65.00	$53.46	$39.76	$38.60
Second mate	55.00	38.88	26.62	27.02
Third mate	40.00	29.16	22.22	22.00
Boatswain	27.50	24.30	16.89	21.23
Carpenter	33.50	29.16	19.00	15.44
Four quartermasters	160.00	82.62	57.12	58.00
Ten able seamen	200.00	109.35	119.00	115.80
First engineer	110.00	77.76	79.31	77.20
Second engineer	70.00	60.75	50.10	36.80
Third and fourth engineers....	110.00	77.76	46.80	58.00
Fifteen firemen and trimmers..	525.00	291.60	195.00	210.00
Five stewards, etc.	.....	.....	.....	.....
Five miscellaneous	.....	.....	.....	.....
Monthly	$1,396.00	$874.80	$671.82	$680.09

When subsidies, bounties and naval reserve subventions are granted by foreign nations to their merchant marine in addition to the above advantages enjoyed by foreign ship owners, the wonder is that any American has the courage to send a vessel to sea to engage in foreign trade and to compete against such adverse conditions.

FREE SHIPS.

The remedy for the adverse conditions under which American ship owners labor, suggested by the democratic party, is "free ships." That is allow citizens of the United States to purchase ships abroad, where they can be had at the lowest cost, and sail them under the American flag. This might remove the obstacle of high first cost, but it would not remove the main difficulty, and that is the high cost of operation of vessels sailing under the American flag. There is one very grave danger, however, in "free ships," and that is Americans might buy cheap ships abroad and sail them under the American flag in the coastwise trade. Thus while "free ships" would not in any way help our over-sea trade, which is the point aimed at, it would ruin what few ship yards we have, besides sending vast sums of American money abroad for ships, and we would be worse off than before, as ship building would become a lost art in our land. The very thought of Americans, who taught the world how to build and sail the old clipper ships, going abroad to have their ships built is painful and unpatriotic in the extreme.

GOVERNMENT AID TO SHIPPING.

This question then presents itself: Is there a remedy for the present deplorable condition of our merchant marine? Is it worth while for the United States to extend national aid to our fast failing over-sea maritime interests, and endeavor to save to our own people at least a large part of the vast sum of $200,000,000 now paid annually to foreigners for transportation? A bill will doubtless be presented to the next congress which will provide for a system of bounties to American vessels of every class that may engage in over-sea trade, from the smallest schooner to the largest steamship. Such a bill was introduced during the last congress, but failed of passage. It provided for an expenditure of not to exceed $10,000,000 a year, for a period of twenty years. The object of this bill, as stated in the title, was "to promote the commerce and increase the foreign trade of the United States, and to provide auxiliary cruisers, transports and seamen for government use when necessary."

It is estimated, should congress pass such a bill, providing for a system of bounties to encourage American over-sea trade in American vessels, that in twenty years, the period of time during which the bounty would be paid, over $2,000,000,000 would be saved to the people of the United States, which would otherwise be paid foreigners for transportation. The maximum bounty that could be paid during the period of twenty years would be $200,000,000, which but equals one year's expenditure by Americans for transportation at the present time, all of which now goes to foreigners. It is probable that not three-fourths of this sum would be expended in bounties, as it would take at least ten years to revive our shipping and establish it, so that it would be some years before the maximum of $10,000,000 per annum would be reached.

The question is: Shall we, as a nation, invest a maximum of $10,000,000 a year in encouraging our merchant marine, in order to reap the benefits as a nation of saving to the people of the United States at least a large part of the $200,000,000 now annually paid foreigners for transportation? The merchant marine would then be rebuilt in American ship yards employing American labor, and greatly advancing our general prosperity. Again, in time of war the government would have a fleet of auxiliary cruisers and transports, and plenty of able seamen to man our battleships and cruisers, while our merchant marine would be winning commercial victories in time of peace and the United States would then be prepared on the sea for any emergency.

Many times the loss of the proposed bounty could be inflicted in a short time on the commerce and industry of our country should we be unprepared to meet a foreign foe on the sea in time of war, as we are today. Apparently there is only one method left for reviving the American merchant marine, and that is to encourage American shipping by government aid, adopting the same methods that foreign nations use, granting bounties and subsidies. A subsidy is payment made to steamship lines for carrying on regular mail service, and is paid only to certain lines of ships. A mileage bounty applies to vessels of all classes in over-sea trade, both sail and steam, favoring none, but placing all classes of ships on the same footing.

SHOULD THE GOVERNMENT AID AMERICAN SHIPPING?

It is continually stated in the democratic press of the country that it is robbery to tax the people of the United States in order to pay bounties to ship owners to enable them to cross swords on the seas with foreign commercial rivals, and thus show the flag of our country to the world and extend our trade. Has it been robbery of the people for the government to give away absolutely free to railroad companies vast tracts of land to encourage the building of new railroads, thereby opening up the vast wealth of our country and encouraging and aiding those enterprises? Who but those who hold the most narrow views will say so? Is it robbery for the government to spend millions of dollars to improve the rivers, harbors and waterways of our country so that larger and deeper-draught vessels can transport greater cargoes and thus reduce the cost of the necessities of life to the people of this country and the world? True, it enables vessel owners to earn a little more money temporarily, but who is there who will question the advisability of such a policy after taking into consideration the vast benefits derived to all the people by cheaper transportation and consequently cheaper products of the mine and the farm and the factory.

Let us put aside our petty jealousies and work together for the good of our country. Let us work to again restore our country's flag to its former glory on the seas on ships built by American labor and manned by American sailors, a bulwark of national defense.

WINTER NAVIGATION OF THE ST. LAWRENCE.

A Quebec special says that European capital is about to be employed in an attempt to accomplish the winter navigation of the St. Lawrence, which is at present closed by ice for five or six months of the year. The main mover in this matter is W. Nordin, head of the timber house of O. W. Nordin & Co., Paris, who has satisfactorily mastered the difficulties attending the winter navigation of the Baltic. He visited Quebec last winter and has again returned to resume the study of the situation. The vessels employed by the Messrs. Nordin for the winter navigation of the Baltic are of special construction, with raised bows heavily sheathed with metal which press down upon as well as cut out the ice, which attains a thickness of several feet in the Baltic. In the St. Lawrence, on the other hand, the river below Quebec is never frozen all across, the danger to winter navigation consisting in the bergs and floating fields of ice. Mr. Nordin's chief aim in striving to extend the season of navigation from the St. Lawrence is to facilitate the shipment of his products to Europe all the year round, without having to bear the additional cost in winter of sending them by rail to an American port. If he ships by way of Saguenay he will have to cut out a great depth of ice in that river, but not more than in the Baltic. He will scarcely attempt to keep the St. Lawrence clear of ice above Quebec, for between that city and Montreal the ice sometimes attains a thickness of nearly 30 ft., grounding on the bed of the river.

One of the greatest difficulties heretofore experienced by the many different persons who have proposed the winter navigation of the St. Lawrence has been that of insurance. Though occasional trips have been made in safety to the lower St. Lawrence in the winter months, none of these has been attempted by large and valuable ocean-going steamers, for the underwriters refuse to insure them because of the supposed perils. It will, therefore, be necessary for the syndicate of Mr. Nordin to become its own underwriters. The importance of this scheme, not only to Quebec, but also to the whole of Canada at the present time, arises from the fact that Quebec proved last summer that she is on the shortest and most direct route for the shipments of grain from the northwest to Europe, and is chiefly handicapped by her inability to continue these shipments during the winter season. It is believed here that the success of Mr. Nordin's scheme would rapidly build up Quebec to be one of the greatest grain shipping ports in America.

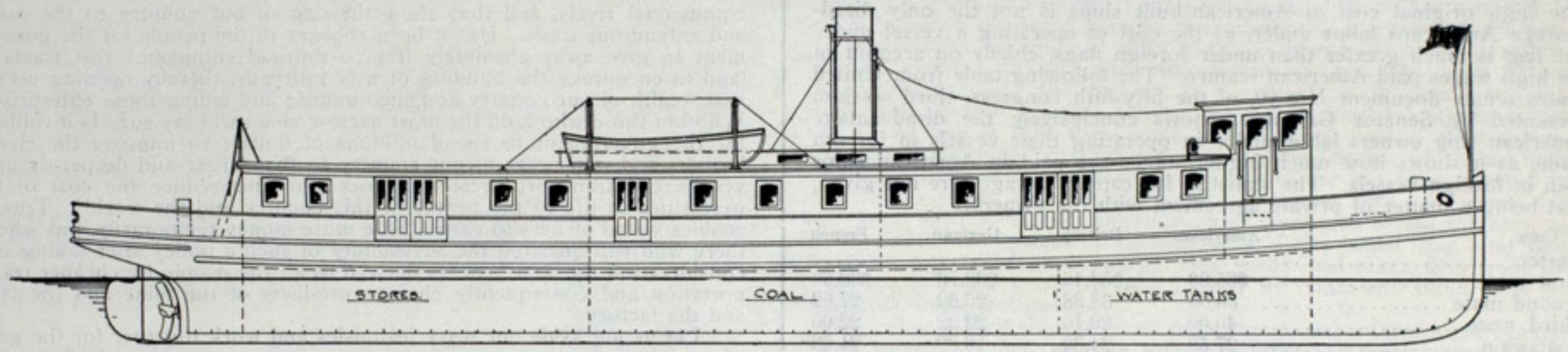
The statement that a new steel corporation to include the principal steel plate industries of the country is being formed has been, in a measure, confirmed by interests identified with a number of the proposed constituent plants. A director of the Tidewater Steel Co. said that negotiations looking toward the centralization of certain steel concerns were under way but had not progressed far enough to warrant any statement bearing on details. When asked if Jones & Laughlins, Ltd., of Pittsburg would be taken over, he replied that he was not in a position to say what companies the proposed consolidation would include. However, an attempt is being made to secure the Pittsburg plant but what success the promotors have met with could not be ascertained. The belief prevails in iron and steel circles that if any new combination of steel concerns is perfected the Jones & Laughlins works will not be found in the list of subsidiary companies.

LIGHT-DRAUGHT CENTRAL AMERICAN RIVER STEAMER.

The growing American interests in the up-river plantations of the Central and South American states have called for a type of steam vessel suited to the navigation of these rivers and the transportation of the plantation products to the river sea ports. The shallow and irregular channels of these rivers requires a comparatively small craft of light draught, yet strongly constructed, to withstand the stresses of frequent grounding, irregular loading and indifferent care. The machinery of these vessels must also be of the same strong, simple type as the hull, and no attempt can well be made to reduce weight beyond the point of inherent safety or to effect economy by the introduction of involved gearing, as with these accidents and break-downs would be apt to occur with the none-too-well trained engineers or firemen who may at any time be placed in charge.

The plans of a vessel of this type are published herewith. They were prepared at the designing office of Mr. George Crouse Cook, 15-25 Whitehall street, New York city, and represent the steamer Maid of Patuca, which is just completing for the American-Honduras Co. of Cleveland, O., who are owners of extensive Central American property on the Patuca river and do a business in the semi-tropical products of the region. The principal dimensions of the craft are as follows: Length (maximum), 97.5 ft.; breadth (maximum), 18 ft.; depth of hull (minimum), 7 ft.; displacement on 4 ft. 6 in. draught, 120 tons; speed (about), 10 knots.

The hull is naturally long and low, but some little sheer is given to gain reserve buoyancy and to insure for the vessel a safe ocean passage to her destination. A continuous deck house is carried the full width of the vessel for 68 ft. amidships, which allows a small clear poop and forecastle deck. The house is divided into three sections for cargo space, machinery casings and accommodations, and passenger cabin. Each section is entered by sliding doors at the sides and lighted by a number of rectangular ports, which also give free ventilation. The hull is well and strongly constructed of carefully chosen material to conform to the requirements of the service. The keel, keelsons, stringers, stem, stern, frames, main beams, sheer bilge and bottom planking are of selected white oak. The hull, topsides, deck planking, ceiling, etc., are of long leaf Florida pine, and the planking on the house sides and top, together with beams, is of clear white pine. All fastenings are of galvanized iron and wherever possible wholly protected from exposure to water and air. The hull is carefully painted and caulked and coppered to a point well clear of the water line. The engine and boiler are of a simple design and of stock type so that any of the parts may be easily duplicated. They are as light as consistent with the desired factor of safety and when steaming at an economical power develop a speed of about 10 knots.



LIGHT-DRAUGHT CENTRAL AMERICAN RIVER STEAMER.

The object of the design and construction of this craft was to obtain a simple, commercially efficient vessel, and nothing was therefore spent in elaborate fittings or finishings. Such a craft as the Maid of Patuca may be considered a safe investment of capital, as on a low first cost a lasting, economical boat is gained—one which may be guaranteed to live for twenty years with the usual care and an occasional overhauling, and which may live almost indefinitely with small outlays for rebuilding from time to time.

NORFOLK SHIP YARD & DRY DOCK CO.

The Norfolk Ship Yard & Dry Dock Co. of Norfolk, Va., was organized last week and the capital stock will be $3,000,000 to $5,000,000. Officers and directors of the company are: G. W. Atkinson, Charleston, W. Va., president; George Blackstone, Baltimore, Md., vice-president; W. H. Anderson, Wheeling, W. Va., secretary; Caldwell Hardy, Norfolk, Va., treasurer; directors, G. W. Atkinson, George Blackstone, W. H. Anderson, Caldwell Hardy, R. L. Herbert of Portsmouth, J. A. Miller of Wheeling, W. Va., J. Penn Herbert of Portsmouth, C. W. Tebault, D. P. Blount and E. W. Wolcott of Norfolk, Peter Silman of Charleston, E. N. Rich of Baltimore, Joseph H. Gaines of West Virginia and Rummell Hollister of Charleston. It is understood that United States Senators Stephen B. Elkins, N. B. Scott and John T. McGraw are interested in the project.

SHIP BUILDING AT PHILADELPHIA AND VICINITY.

Philadelphia, Nov. 13.—The developments in connection with the new J. M. Guffey steamship line between Sabine Pass and this port have reached a stage where they are of the greatest interest to local shipping men. It is now certain that the town of Marcus Hook, about 23 miles below here on the Delaware river, will be the northern terminus of the line and from the indications at present will become one of the most important oil distributing centers in the United States. The Texas Oil Co. will begin operations with the new steamship J. M. Guffey, formerly the M. S. Dollar, and the pioneer vessel from the New York Ship Building Co.'s works. This steamer has been altered into a tanker and will shortly load at Sabine Pass. In addition, the Neafie & Levy Ship & Engine Building Co. is hurrying work on two new tankers for which a contract was signed several weeks ago. They will also convert into a bulk oil carrier a steamship recently purchased on the great lakes. This will give the new line a fleet of four modern steamships, in addition to a schooner and two barks. Neafie & Levy have nearly completed two steel barges to carry bulk oil for this line. They will each have a capacity of about 1,000,000 gallons. These vessels will deliver oil at Marcus Hook to the Suburban Oil & Gaslight Co., a new concern, incorporated by Pittsburg capitalists, who have purchased twenty acres of land at the Hook with a frontage of several hundred feet on the Delaware river. The work of building great storage tanks and machinery for refining the Texas oil has already been started. It is proposed to remove the sulphur and objectionable ingredients from the oil and to fit it for foreign as well as the domestic trade. The new industry will give employment to many persons in Chester and Marcus Hook.

A syndicate is being formed in Philadelphia to purchase a floating dry dock for use in the harbor. It is an improvement which unquestionably has been needed in these waters for many years. Vessels leave here in large numbers for New York and other ports for repairs because there are only two private dry docks on the Delaware. It is understood that money is already being subscribed for the new enterprise, but the details will not be apparent for some days. If a suitable dock cannot be purchased a contract will be given to some ship yard having facilities for rapid work.

The Cramps turned out an interesting contrivance last week. It was a floating 100-ton derrick for the use of the Brooklyn navy yard and left this port last Thursday in tow of the tugs Somers N. Smith and Ivanhoe. The derrick cost $100,000 and will be employed in slinging 13-in. guns and other heavy armament of battleships and cruisers.

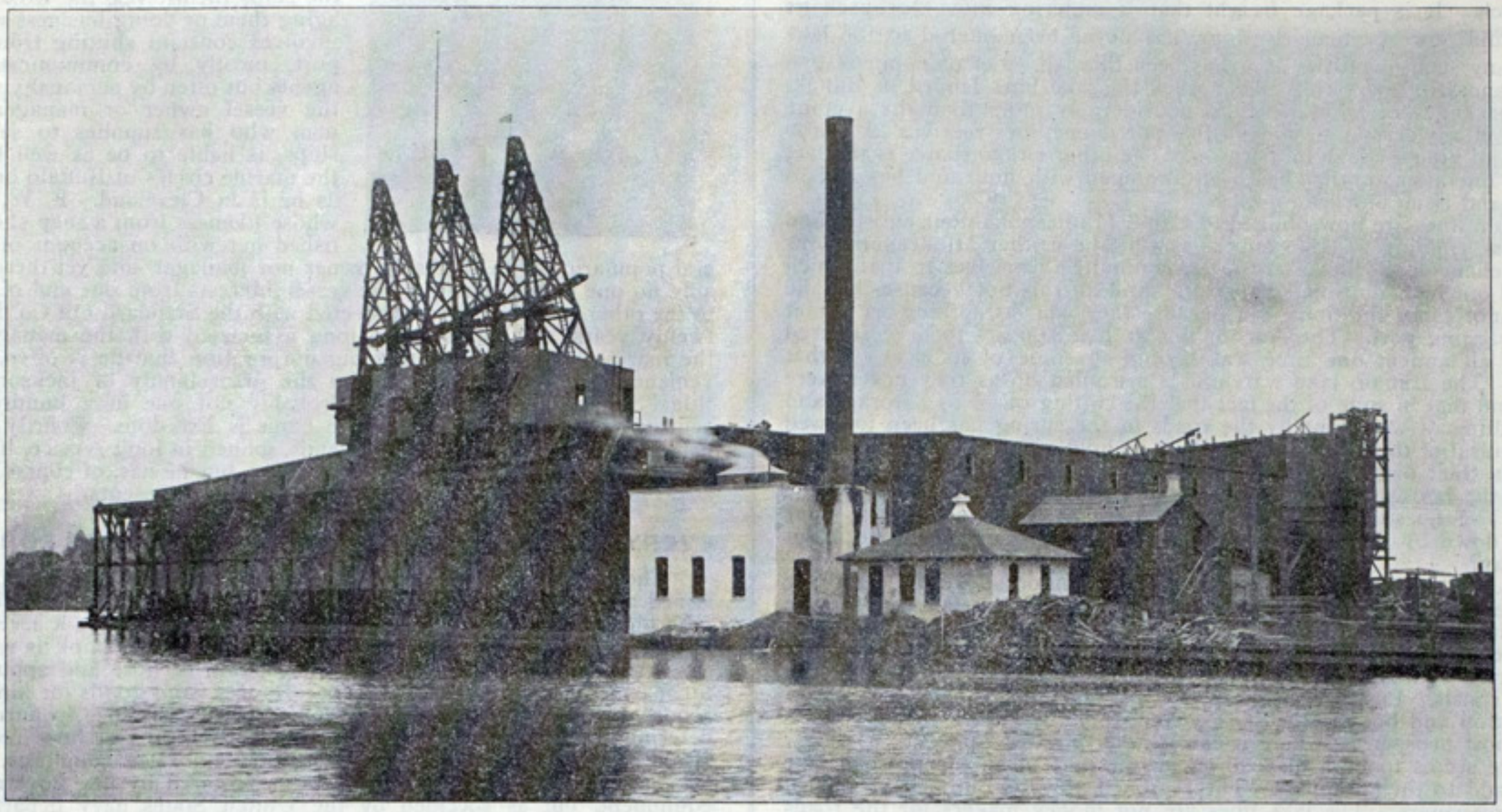
The Neafie & Levy company has practically in hand material needed for the first stages of the construction of the new protected cruiser St. Louis and this important work could be inaugurated at once if there was a place available about the ship yard on which to put down the keel. It has been decided by the company, however, that this will not be undertaken until the cruiser Denver is in the water. The launch of the latter will follow within a few weeks. The first plate of the St. Louis' keel will go down on the blocks that very day and the builders will aim at record time in her construction. These are busy days at this prosperous Kensington ship yard. Neafie & Levy at present employ more men and have more important work on hand than ever before in the history of that firm. Only a few short years back they were identified mainly with the building of tugs and small steamboats and the change within that time to big cruisers, torpedo boats, steamships and yachts is startling.

An interesting craft in port at present is the British steamship Manchester Importer, which in the future will run on the newly established line between this port and the inland English city of Manchester. The Manchester Importer is consigned to Charles M. Taylor's Sons. Her principal dimensions are: Length, 370 ft.; beam, 48 ft.; depth of hold, 26½ ft., and tonnage 4,039 tons gross.

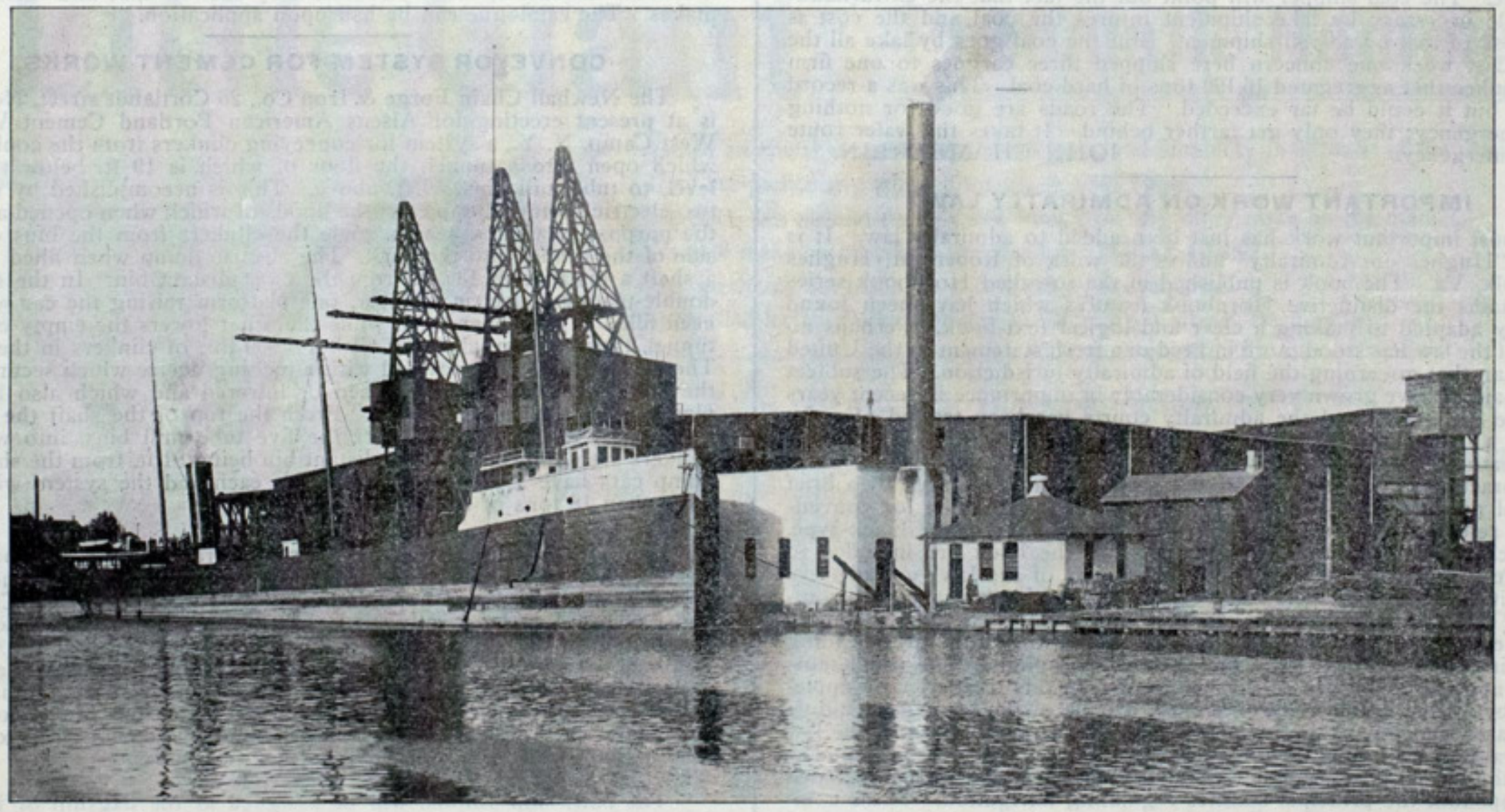
At the Jackson & Sharp yard, Wilmington, Del., on Saturday, the hull of the wooden tug John L. Brainerd, which is being built for John L. Brainerd of New York, was launched. The boat is 100 ft. long. She will be equipped with machinery in Hoboken. She was christened by Miss Edna W. Brainerd, a daughter of the owner.

LARGE COAL DOCK AT SHEBOYGAN.

In December last one of the several coal docks operated by the C. Reiss Coal Co. at Sheboygan, Wis., was destroyed by fire and it has since been replaced by a very large structure, which is illustrated in two views presented herewith. The C. Reiss company receives immense quantities of both hard and soft coal by lake at Sheboygan and distributes it in all parts of the northwest. The new dock, in which is shown the hoists for unloading vessels, is at present being used entirely for anthracite coal, but an extension for soft coal is planned, in addition to other docks which the company now uses for soft coal. The new structure contains over 1,500,000 ft. of lumber, which was specially prepared in the state of Washington. The company's track facilities make it possible to spot twenty-four cars, averaging 30 tons each, at one time, and load in the aggregate 7,200 tons a day. The working equipment is of the latest and most approved pattern for handling coal. Electricity, generated on the premises, drives all the machinery excepting the hoists, which are operated by steam.



NEW COAL DOCK (ANTHRACITE) OF C. REISS COAL CO. AT SHEBOYGAN, WIS.



NEW COAL DOCK (ANTHRACITE) OF C. REISS COAL CO. AT SHEBOYGAN, WIS.

Mr. J. L. Frohman of the Engel & Fagersten Chemical Co. of Chicago, manufacturers of Neptune anti-fouling composition, has been calling on vessel men in Cleveland during the past week.

Capt. Richard W. Sargent, marine superintendent of the William Cramp Ship & Engine Building Co., Philadelphia, died of paralysis a few days ago.

SEARCH LIGHT ON THE DIAMOND SHOALS LIGHTSHIP.

An experiment of great interest to the lighthouse system of the world is to be made on the Diamond shoals lightship when she is placed on her station next December, through which the officers of the lighthouse board expect to project a great 13-in. beam of light from the sea to the sky, which will be visible to mariners from 30 to 40 miles. The cluster of white electric lights now shown from the masts of the lightship have a visibility of only thirteen miles, and it is proposed that shipping passing Hatteras may be able to pick up the lightship three times the distance by the powerful beams of light playing on the heavens. The secretary of the lighthouse board believes, if the test is successful, that it will play a most important part in the lighthouse system and will be applied to all lightships of the future. The apparatus now being fitted to the Diamond shoal lightship at Baltimore will project a beam straight toward the sky, and the rolling of the ship in the rough waters off Hatteras will play it about in wig-wag fashion and naturally attract attention. War ships have been known to maintain communication for thirty miles by wig-wagging their search lights. Officers of the lighthouse service believe it will be possible to employ a search light system on lightships by which the locality of the vessel may be discovered fifty miles away under favorable weather conditions. It is contended that as a guide to mariners the new system, throwing a 13-in. beam light into the dome of night, will be as far in advance of the electric beacons of the first order as the beacons were ahead of oil lamps.

THE BLOCKADE OF LAKE PACKAGE FREIGHT.

Buffalo, Nov. 13.—The crippling of the lake trade this fall by the lack of railroad facilities is considerably greater than formerly, large as the cutting down of business from this source often is as the end of the lake season approaches. Quite often the difficulty is pretty generally confined to grain carrying, but while that is suffering more or less now, the rather light traffic naturally in that line has made it impossible to handicap it very much. It is package freight that is suffering most, for package freight, and more particularly flour, has never been offered to the lake lines in any such quantities as it has been this fall. Let us compare two circumstances to prove this. Last week the lake lines landed in Buffalo 420,000 packages of flour, which is considerably more than the average has been in any season so far and this port sometimes receives 12,000,000 packages of flour by lake in a season. The other circumstance is the fact that one line after another has been swamped with flour and has had to shut off and issue blockade notices.

Certain lines are now obliged to refuse Minneapolis flour entirely and still others, running to Lake Superior, will take neither Minneapolis flour nor miscellaneous northwestern flour, confining themselves to that which is turned out in Duluth and Superior. And all this not because the lake lines cannot carry the flour, but because they can do nothing with it at the discharging port. The Anchor line at Erie appears to have suffered worst of all and at one time was laying up some of its fleet on that account. The Buffalo lake warehouses are piled up as they never were before, and that in spite of the fact that the cutting off of free storage and free handling of way flour by the roads in the spring has been followed by the refusal of the Minneapolis millers to hold a pound of flour in these houses on their own account to pay freight on, where they had formerly crowded the houses full of flour to be carried through the winter by the roads. The question is, What would have been the amount of flour brought down by the lake lines had both these circumstances been out of the way?

The fact appears to be that the roads cannot afford to carry the enormous equipment of rolling stock they need in the fall just for the fall requirement alone. Besides they have no adequate storage room for them when they are not in use. What is to be done? Someone says that the situation is an argument in favor of canal enlargement and the building of more canals. Possibly, but if it is the roads should make the best of the situation and not oppose such a step, for it is known that a road is always most prosperous where it can parallel a water route.

There seems to be a disposition on the part of all the railroad lake lines to add to their tonnage. The reason is this, as outlined by one of the line managers: The lake lines are not money makers for the roads direct, as everyone knows. They are not allowed to be and their competition with the roads is by no means as actual as the assistance they afford the roads in holding the lake route, which is really the route that ends at Buffalo, against the competition of southern routes. With the lake lines out of the way the great lead that has always been maintained would be lost, for the ability to send down a full ship load of flour at any time enables the trunk lines to take freight without limit, which is what the shipper demands.

It is very much the same with the west-bound coal trade, at least in anthracite. The coal shipper will point out the fact that the extra handling made necessary by lake shipment injures the coal and the cost is often close to that by all-rail shipment. But the coal goes by lake all the same. Last week one concern here shipped three cargoes to one firm in Milwaukee that aggregated 16,190 tons of hard coal. This was a record breaker, but it could be far exceeded. The roads are good for nothing in an emergency; they only get farther behind. It takes the water route for an emergency.

JOHN CHAMBERLIN.

IMPORTANT WORK ON ADMIRATLY LAW.

A most important work has just been added to admiralty law. It is entitled "Hughes on Admiralty" and is the work of Robert M. Hughes of Norfolk, Va. The book is published in the so-called Hornbook series and contains the distinctive Hornbook features which have been found peculiarly adapted to making a clear and logical text-book. Perhaps no branch of the law has stood more in need of a fresh statement in the United States than that governing the field of admiralty jurisdiction. The subject may be said to have grown very considerably in importance in recent years but while the practice of the admiralty courts has been treated of satisfactorily a late discussion of the substantive branch of the law has been a desideratum to practicing lawyers. The book will be found quite valuable to practitioner and student alike. Each section is prefaced by a brief analytical presentation of leading principles and rules, which for convenience of reference is distinguished by being printed in large black type. The black-letter paragraphs running through the book are intended to constitute a complete, though concise, synopsis of the law—a bird's eye view of it, so to speak. The body of the text set in ordinary type comprises a commentary upon the general principles. The notes contain authorities for the doctrine stated in the text, the titles of the great leading cases being distinguished by being printed in capitals. The usual table of cases appears at the end of the volume but in this treatise it is supplemented by a very useful feature, namely, a table of the leading and illustrative cases topically arranged. In addition to a presentation of the law of admiralty as laid down in the authorities, the author gives a summary view of the pleading and practice in admiralty courts and he has included in the appendix the principal statutes regulating navigation. These comprise the international rules, the rules for coast and connecting inland waters, the dividing line between the high seas and inland waters, the lake rules, the Mississippi valley rules, the act of March 3, 1899, as to obstructing channels, the limited liability acts of 1851 and 1884, section 941 of the revised statutes as amended, regulating the bonding of vessels, the statutes regulating evidence in the federal courts, the law of 1892 regarding suits in forma pauperis and the admiralty rules of practice. One of the chapters of the book which will be found of recent interest is that dealing with water carriage as affected by the Harter act of 1893. The book is for sale at $3.75 per copy and may be had from the Marine Review Publishing Co.

The Wolff & Zwicker Iron Works & Ship Building Co., Portland, Ore., has been sold to Drake C. O'Reilly for $42,000.

FREEDOM W. JACKSON.

One of the peculiarities of the lake shipping district, covering an expanse east and west of about a thousand miles is the fact that men actively connected with the industry are not known particularly in any of the leading ports, such as Buffalo, Cleveland, Chicago, Duluth, etc., but most have an acquaintance in all of these places. Like the ships themselves, the work of managing them or doing business with them involves constant shifting from port to port, mostly by communication with agents but often by personal visits. Thus the vessel owner or manager, or the man who has supplies to sell to the ships, is liable to be as well known in the marine circles of Buffalo or Chicago as he is in Cleveland. F. W. Jackson, whose likeness from a snap shot is published herewith on account of his general popularity, is neither ship owner nor manager, and yet there is probably no one better known to the vessel interests from one end of the lakes to the other. He has been connected with the Standard Oil Co. for nearly twenty years, and has been so long associated with the management of the marine department of that big corporation that he is often, for convenience sake, distinguished from the great family of Jacksons by the title "Standard Oil Jackson." Probably not one in a hundred of his acquaintances know that his given name is Freedom. Courtly manners, persistent energy and a host of friends, gained in long service, have given him a firm hold on oil business with ships, but he has, of course, no small advantage in the strong organization that he represents.

EVERYTHING IN THE LINE OF RUBBER GOODS FOR SHIPS.

The Boston Woven Hose & Rubber Co., Cambridge, Mass., has just issued a catalogue devoted to its marine rubber goods. It is illustrated with photos of battleships and merchant ships which give it a very attractive appearance. The company's introduction to the book is as follows:

"As the quality and general construction of hose and appurtenances for marine purposes differs in many instances from goods for kindred uses ashore, we have prepared this pamphlet as an assistance to purchasers in determining the quantity, quality, sizes and lengths of hose required by steam vessels, together with the most suitable nozzles, couplings, strainers, etc., not only for merchant steamers as required by law governing such equipment, but as specified by the United States navy department for government vessels. With years of experience in the manufacture of a general line of mechanical rubber goods, and after a long series of experiments made with a view to most completely meeting the requirements of our navy and merchant marine, we are much gratified, not only with the standard of excellence we have attained in the manufacture of these specialties but in the large demand established for them and the readiness with which they pass the severe tests and rigid inspection specified by the government."

The catalogue describes minutely suction hose, fire hose, upper-deck fire hose, steam hose for fire rooms, navy suction hose and various other makes. The catalogue can be had upon application.

CONVEYOR SYSTEM FOR CEMENT WORKS.

The Newhall Chain Forge & Iron Co., 26 Cortlandt street, New York, is at present erecting for Alsens American Portland Cement Works at West Camp, N. Y., a system for conveying clinkers from the cooling bins, which open into a tunnel, the floor of which is 19 ft. below the grade level, to tube mill bins, 50 ft. above. This is accomplished by means of two electric bottom-dump cars, the hoods of which when opened also serve the purpose of chutes, which guide the clinkers from the bins on either side of the tunnel into the cars. The electric dump when filled is run to a shaft a distance of 130 ft. from the most distant bin. In the shaft is a double-platform electric elevator, one platform raising the car which has been filled at the upper level, while the other lowers the empty car to the tunnel, thus counterbalancing all but 4,000 lbs. of clinkers in the full car. The elevator cars are provided with a locking device which securely locks the dump cars when being raised or lowered and which also holds the platforms at the landing levels. From the top of the shaft the car runs along a trestle 42 ft. long, over the five tube mill bins, into which the clinkers are dumped, the most distant bin being 91 ft. from the shaft. The dump cars have a capacity of 4,000 lbs. each and the system will handle more than 18 tons of clinker per hour.

Three Atlantic liners had an interesting race across the ocean last week. The Philadelphia of the American line, the Lucania of the Cunard line and the La Savoie of the French line left Southampton, Cherbourg and Liverpool at practically the same time, distance considered. La Savoie passed the Philadelphia on the second day out, but the Philadelphia held her almost to Nantucket. Neither of the vessels saw the Lucania until arrival, although the Lucania and La Savoie were in communication with Nantucket by wireless telegraphy at the same time. La Savoie passed the Sandy Hook lightship first, but was unfortunate enough to touch bottom at Southwest spit, which delayed her two hours.

The battleship Illinois will be assigned as the flagship of Rear Admiral Crowninshield when he takes command of the European station. Some surprise is expressed at this change, inasmuch as it has been generally understood that the Olympia had been fitted up at great expense for this special service. Since its reconstruction in the Boston navy yard it is one of the most elegant ships in the navy and better adapted for the purposes of a flagship than probably any other vessel. There is a suspicion that the Olympia is being reserved for Admiral Dewey when he attends the coronation of King Edward.

The navy department has revoked the contract of the Union Bridge Co. of New York for the construction of a coaling station at Dry Tortugas, Fla., and has amended the specifications applying to that work. Bids will be opened at the bureau of yards and docks on Dec. 2.

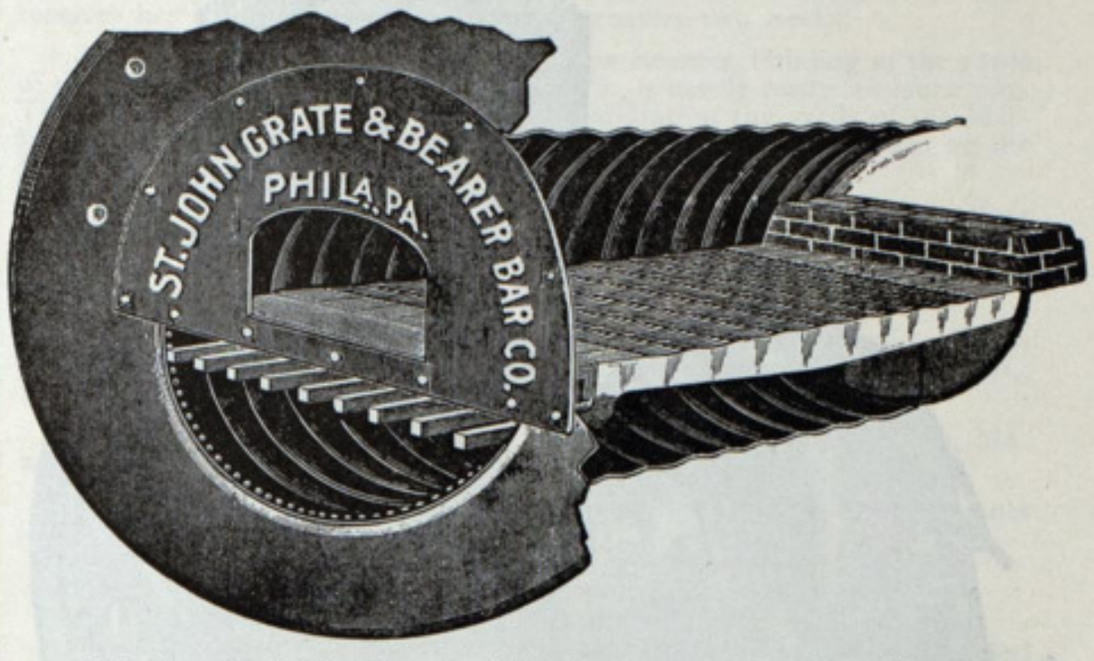
ST. JOHN GRATE AND BEARER BAR.

The St. John grate and bearer bar, illustrated herewith, has been used with great success on a large number of battleships and cruisers built at the works of the Cramps, Philadelphia, and also on several large merchant ships built at the same works for the International Navigation Co. It is also in use in stationary plants all over the country and in hundreds of vessels other than those referred to above, but the Cramp ships are spoken of on account of their prominence. The naval vessels include the cruisers New York, Columbia, Brooklyn and Minneapolis of the United States navy; battleships Iowa, Indiana, Massachusetts, Alabama and the new Maine of the United States navy; cruiser Kasagi of the Japanese navy; cruiser Variag and battleship Retvizan of the Russian navy. Edwin S. Cramp, superintending engineer of the William Cramp & Sons company, says:

"We have used the St. John grate bars and bearers on several vessels built by us for the United States navy, on the cruiser Kasagi for the imperial Japanese navy, on vessels for the Russian navy, and on a great number of merchant vessels in the transatlantic service. During the official trials of these vessels we were able to maintain a uniform steam pressure for the entire period, and at no time did we find it necessary to clean fires by hand, all the refuse being broken up and passed through the bars by shaking, thus avoiding the injurious consequences liable to ensue from keeping the furnace doors open too long. The work of the firemen is minimized, and the fires are kept in good condition for their entire length. When the ships returned to our yard and after the furnaces were all cleaned, a close examination was made, and all the bars were found to be in excellent condition. This we consider remarkable, as during the trials the pressure in the fire rooms averaged from 9-10 in. of water on some of the vessels to 2¼ in. on others. It is the best shaking grate bar we have ever seen."

The manufacturers, St. John Grate & Bearer Bar Co., 1225 Betz building, Philadelphia, make the following claims:

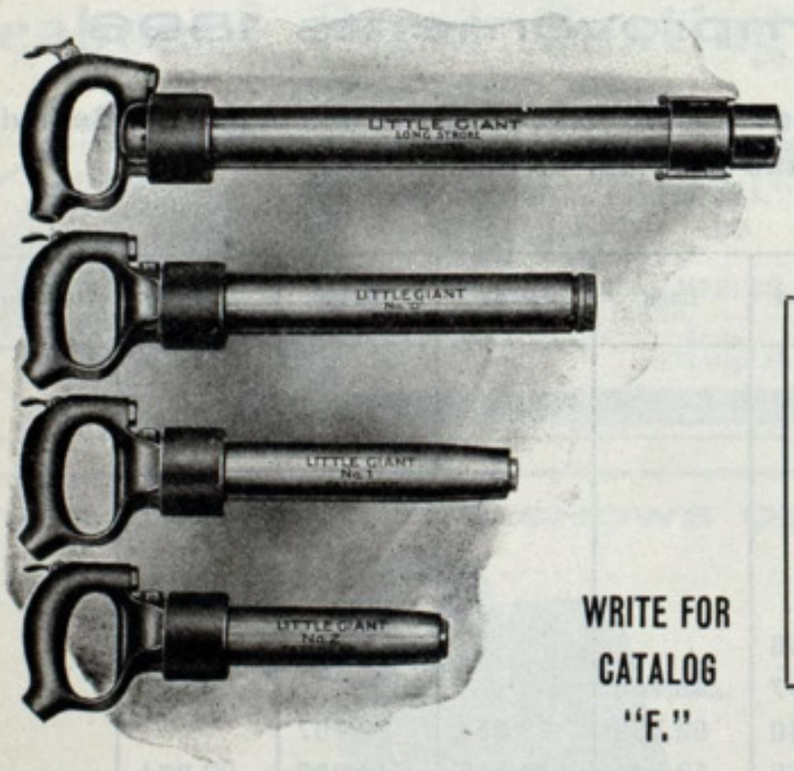
"Owing to their construction, these bars will burn more coal per square foot of grate than any other bar with the same draft conditions. They will save labor in that 'prick' bar need not be used. The slicing is reduced one-half, and the number of regular cleanings reduced two-thirds or more. Coal is burned more economically, owing to the peculiar construction of the bar, and the clinker is kept from forming, and drops to the ashpit, thus leaving a good open fire at all times. Clinker cannot fasten to the bar on account of the corrugated surface forming the face of the bar, and the air is administered in such a way as to make it brittle and easily broken. Each bar works independently, thus allowing grate action upon any part of the fire. Even with the intense heat secured by the peculiar construction of these bars, the moment the ash and clinker begin to form it rests upon the peaks of the corrugations, and the air admitted under clinker and between the peaks prevents the bar from becoming heated, thereby prolonging the life of the bar indefinitely. As the clinker cannot fasten in the bar, being easily shaken into the ashpit, the fireman is not discouraged from using the shaking movement, as in the case of so many so-called shaking grates, where the clinker jams and a man is not able to move the bars at all. As these conditions do not exist, and the bars are easily shaken at all times, a fireman is much more apt to keep his fires clean, and so reduce the cleanings as much as possible, thus making his work easier and prolonging the life of the bridge walls as well as side walls,



and the fact of the fire-door not being open as much as in ordinary cases, causes a reduction in the repair bill to the boiler itself in removing strains due to sudden contractions from the influx of cold air and the resultant saving of fuel in this one way is considerable."

A catalogue (D) just issued by the Cleveland Pneumatic Tool Co., Cleveland, O., deals with its hammers, riveters and drills. It is most excellently illustrated and printed. In its introduction the company says that while the pneumatic tool has been known in a limited way for many years, the tool of this kind that is now being offered as an adjunct to the machinery equipment of all up-to-date shops and factories might properly be classed as a modern device. The evolution of development in perfecting these tools during the past four or five years has been characterized by tremendous strides and lightning changes. As a means of cheapening the cost of production and at the same time aiding in the rapidity of filling contracts, giving to the consumer a product of the highest grade, pneumatic tools occupy a field separate, alone and unapproachable by any mechanical device now known. The company claims to be able to furnish the most reliable tools that genius and skill have yet produced. The company will furnish its tools on trial.

"Little Giant" Pneumatic Hammers



WRITE FOR CATALOG "F."

have gained an enviable reputation for efficiency and durability in all parts of the world.
They are particularly adapted for use in Ship Yards.
Use 50% less air and do far more work than any other make on the market.
You will make no mistake if you order a "LITTLE GIANT."
Any mechanic can make the occasional repairs required.
Unexcelled for all classes of Riveting, Chipping, Calking, Beading, etc.

Acme of Pneumatic Tool Construction.

Size 000	Adapted to Riveting up to 1¼ inches.
Size 00	Adapted to Riveting up to 1 inch.
Size 0	Adapted to Light Riveting.
Size 1	Adapted to Extra Heavy Chipping.
Size 2	Adapted to Chipping and Heavy Calking.
Size 3	Adapted to Light Chipping, Calking and Beading Flues.
Size 4	Adapted to Beading Flues and Calking.
Size 5	Adapted to Beading, Light Calking and Chipping.
Size 6	Adapted to Light Chipping and Sealing.

NO VIBRATION.

NO DELICATE PARTS.

Sent on trial and express paid both ways if not satisfactory.

We manufacture the largest variety and best Pneumatic Tools on the market.

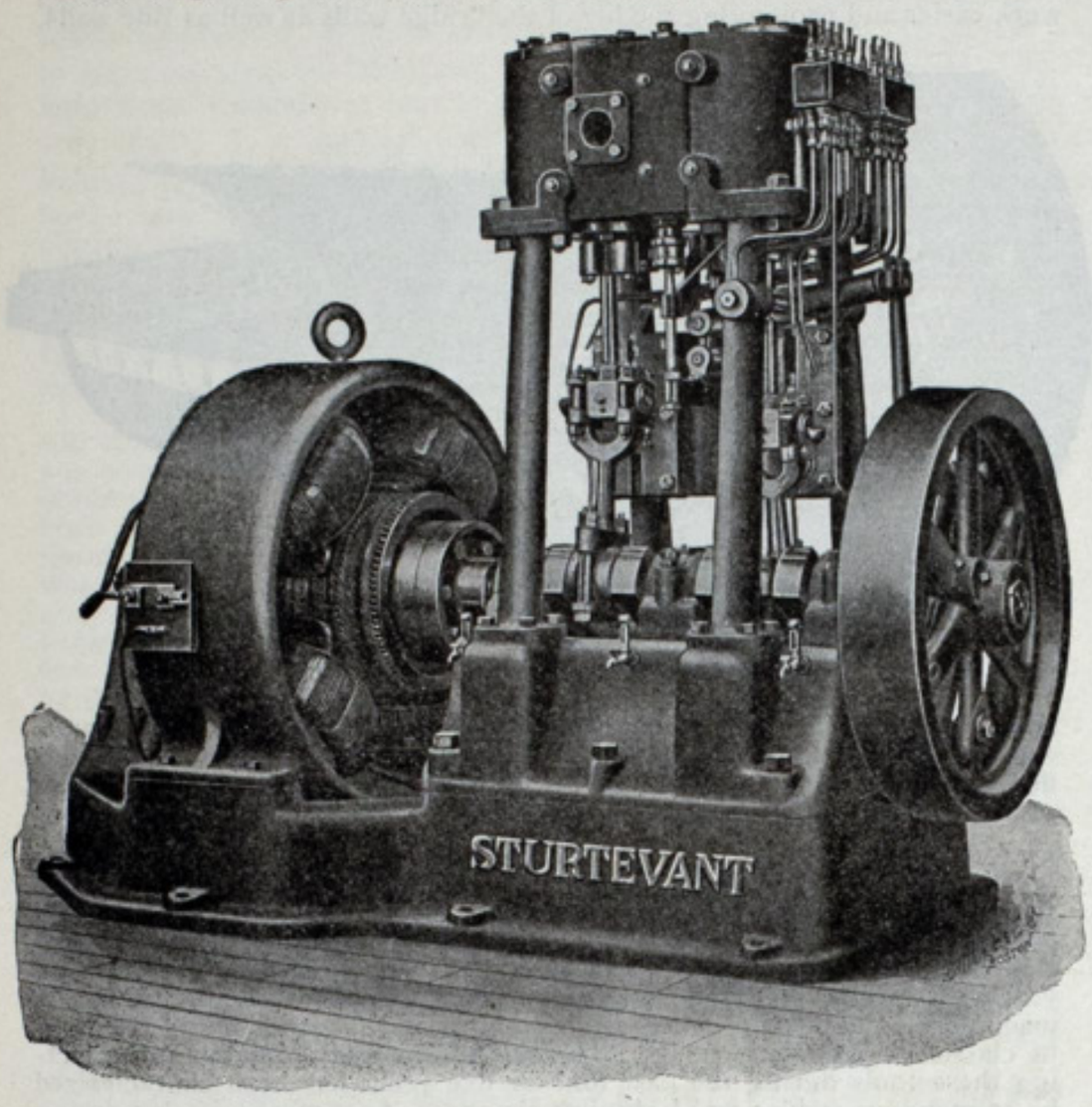
STANDARD PNEUMATIC TOOL COMPANY,

Manufacturers of Air Drills, Hammers, Reversible Flue Rolling, Reaming, Tapping and Wood Boring Machines, Motor Chain Hoists, and Pneumatic Tools and Appliances of Every Description.

General Offices and Works: AURORA, ILL. Eastern Offices: 141 Broadway, NEW YORK.

A TYPICAL STURTEVANT GENERATING SET.

During the past few years the B. F. Sturtevant Co. of Boston, Mass., has been making great strides in the development of its electrical department. Beginning as it did with the building of motors for direct connection to fans, it took some time to convince the public that this company was definitely in the field as builders of a special line of small high-grade generating sets. This work, however, is the natural outcome of the possession of a very extensive line of engines of over 100 sizes and under 250 H.P., and of a similarly extensive line of sizes of motors designed for direct connection to fans. By simple combinations of these engines there has been produced a varied line of generating sets.



In the accompanying illustration is presented one of the latest designs in a generating set with open-type vertical compound engine and four-pole generator. In this design the bed carries three main journal bearings, brass-bushed in their lower halves and provided with continuous oiling devices in connection with oil reservoirs beneath; its interior is formed into a basin which collects all drip from water or oil. The four heavy upright columns are securely fastened to this bed, and to the upper ends is bolted the single-cylinder casting, comprising the two cylinders, which are of relatively large diameter and short stroke. Two piston valves are operated in unison by a single rocker and yoke, each regulating the admission of steam to one cylinder. The cross heads are of the slipper type with projecting cross-head pins. The connecting rods have yoked cross-head pin ends and are of large size. Both connecting rods and cross-heads are of forged steel and all parts of the engine are of the highest grade as regards material and workmanship. The cylinders are thoroughly lagged. Complete sight feed oiling arrangements are provided for all bearings. These engines are built in sizes 6½, 11x5½ and 7, 13x5½ with output at 150 lbs. of 47.5 and 60 H.P. The armature shaft is direct connected to the engine shaft and carries an armature of the barrel-wound tooth-drum type with slotted discs of carefully annealed sheet steel, which, after being coated with an improved insulated varnish, is mounted upon a cast iron drum. This drum is provided with longitudinal air ducts which connect in turn with radial ducts passing through the core, and by means of small blades or vanes inserted in these ducts compel the circulation of a constant current of air, thereby greatly facilitating ventilation and insuring an extremely cool running armature.

The winding for all low voltage machines is of copper bars. High voltage or very slow speed machines have the armature wire-wound with machine-formed coils, which coils are thoroughly insulated before being placed upon the core. The magnet frame is of special magnet steel and has the field cores cast therewith. The ring is cast in one piece. The commutator consists of drop-forged segments of pure copper, mounted upon and secured between cast iron flanges of spider construction which allow a circulation of air inside as well as outside and conduces to low temperature. Carbon brushes only are used in these machines and mounted in holders of the sliding socket type with easy facilities for adjustment and removal. A full load run for a sufficient length of time to bring every part to its maximum temperature has never been found to produce a temperature rise exceeding 40° Cent.

Excursion rates to Florida via Baltimore & Ohio R. R. and Washington, D. C., passing through the beautiful cities of the south. Stop over privilege allowed on all round trip tickets. Two fast trains leave Cleveland daily at 3:00 and 11:20 p. m. Call at city ticket office, 241 Superior street. tf.

For navigation charts apply to the Marine Review.

BELLEVILLE GENERATORS

Grand Prix 1889 — Hors Concours 1900
Originated 1849 — Latest Improvements 1896

Number of Nautical Miles made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australien	Polynésien	Armand Béhic	Ville de la Ciotat	Ernest Simons	Chili	Cordillère	Laos	Indus	Tonkin	Annam	Atlantique
1890.....	67,728	2,460										
1891.....	68,247	68,331	204									
1892.....	68,247	68,403	69,822	23,259								
1893.....	68,379	68,343	68,286	68,247								
1894.....	68,439	68,367	68,574	68,439	37,701							
1895.....	68,673	68,766	68,739	68,808	40,887	28,713						
1896.....	69,534	92,718	69,696	69,549	62,205	63,153	40,716					
1897.....	68,250	69,606	92,736	69,555	62,235	76,110	63,357	43,146				
1898.....	70,938	69,534	69,552	69,597	62,526	63,240	63,240	62,553	63,954	22,707		
1899.....	69,534	69,615	67,431	90,405	60,246	62,778	62,868	52,344	54,855	44,007	22,884	
1900.....	69,534	67,494	69,744	69,564	61,719	62,382	62,502	51,471	53,373	62,016	63,066	52,140
Total.....	757,503	713,637	644,784	597,423	387,519	356,376	292,683	209,514	172,182	128,730	85,950	52,140

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WORKS AND YARDS OF L'ERMITAGE AT ST. DENIS (SEINE), FRANCE.
TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT-DENIS-SUR-SEINE.

ALLEN INDICATOR GAUGE GLASS.

Allen's water level indicator gauge glass, illustrated herewith, is sold by the Contractor's Tool Co., 118 S. Sixth street, Philadelphia, and they show by testimonials, etc., that it is in general use and very highly commended. It is made to stand from 500 to 1,000 lbs. pressure, according to size, and it is not necessary to buy new valves, as the device will fit any ⅝ or ¾ gauge glass fittings that may be on boilers. It is claimed for the Allen gauge glasses that they show the exact amount of water in a boiler under all circumstances. Each contains a glass float colored with a composition that makes it visible in dark places, and it is so constructed that it stands straight without touching the glass, the top end floating evenly with the surface of the water, thus showing a white spot at the height of the water in the gauge glass.

The peculiar shape and action of the indicator keeps the gauge glass clean. All the glasses are made expressly for the Philadelphia company by one of the oldest and largest firms in Scotland, who use nothing but the most carefully-selected material and skilled workmen in the manufacture of the glasses, enabling them to bear great variation of temperature and preventing them from hanging color.

William L. Mars, engineer of machinery and foundry department, Sherman S. Jewett & Co., Buffalo, says in a letter of recent date to the Philadelphia company: "I am so well pleased with the three indicators that I have had in use since October, 1889, that I now order one for a new boiler, which you will please send by return mail. Since putting in your indicator I have dispensed with the use of a 3-ft. gas burner at each of the water-glasses during the day, making a saving of over 2,000 ft. of gas a month. I also find that the action of the indicator prevents the corroding of the water-glass. I would not be without them for ten times the cost."

SHIP YARD NOTES.

It is reported that George L. Welt of Waldoboro, Me., will build for the Palmers of Boston next summer a six-masted wooden schooner, the largest vessel ever built in Waldoboro. Work on the three-masted schooner under construction in Bowker's yard in Phippsburg, Me., is being delayed on account of the non-arrival of timber from Fryeburg. A five-masted schooner at Deering's yard, Bath, Me., will go overboard in a few days. Mr. Deering will build a three-master of 700 tons this winter. Sawyer Bros., Millbridge, Me., have the keel of their three-masted schooner laid and the force is employed on the frames, the work of which is to be hurried along. Capt. Warren Sawyer will improve his ship yard at Millbridge this season by adding 100 ft. to his wharf. Material is being collected for the work, which will be commenced as soon as the Frances C. Tunnell receives her finishing touches, which will require two weeks.

The old Dominion Steamship Co.'s new steamer, building at the yards of the William R. Trigg Co., Richmond, Va., is nearly ready for launching. This steamer, together with a duplicate building at the yards of the Harlan & Hollingsworth Co., Wilmington, Del., will make night runs on the James river, carrying both passengers and freight.

Cobb, Butler & Co., Rockland, Me., have built two vessels at their ship yard during the present season and have just laid the keel for a third one. They have now on the stocks a three-masted schooner of about 450 tons, building for Capt. Saunders of Orland, Me.

The schooner Annie, building by Carleton, Norwood & Co., Rockport, Me., was launched this week. Her dimensions are: Length, 127.3 ft.; breadth, 37 ft.; depth, 13 ft.

A four-masted wooden schooner in Percy & Small's yard, Bath, Me., which is to be launched this week, will be christened Miles M. Merry.

C. G. White, Everett, Wash., has just launched a four-masted schooner for John Pedersen of San Francisco.

STEEL PROPELLER WHEELS.

It is safe to say that the year 1901 will show a larger number of steel propeller wheels having been made up than the total for any two previous years, the Marine Iron Works (Station A, Chicago) alone having more than doubled any previous year's sales on these steel wheels, with three months yet to hear from. The composition being an open hearth homogeneous steel, is exceedingly tough and ductile. The sizes range from 30 in. diameter up to 5 ft. The higher first cost when compared with the cast iron wheels is very quickly earned, especially where boats are operating at times on somewhat shallow water. 8

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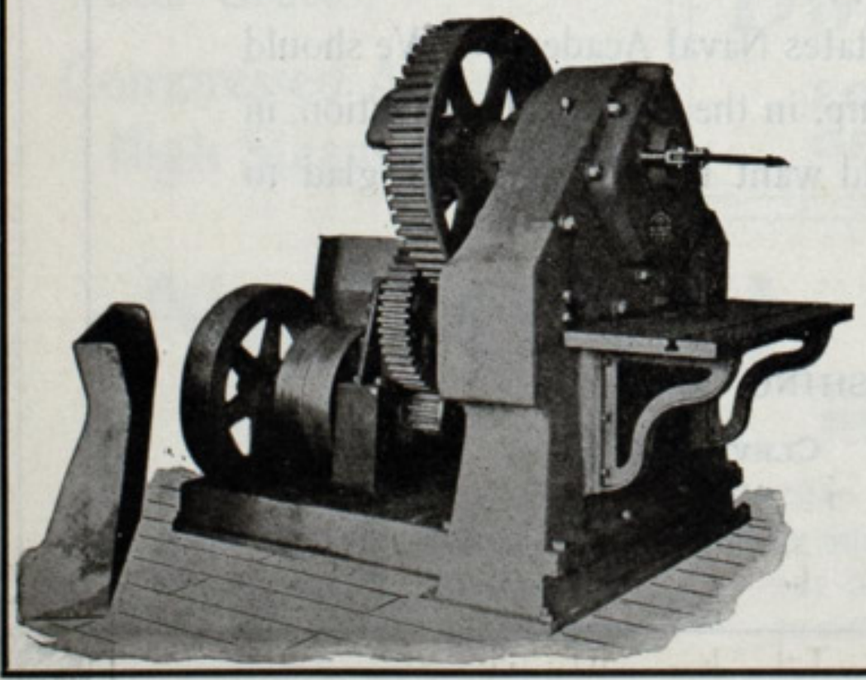

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But changes, wonderful to contemplate, have marked the last half century. The name of the great revolution was steam. Through its agency seamanship lost its old command. It became subordinate to the science of navigation. All existing volumes upon seamanship speedily became obsolete. But yesterday of unquestioned authority, today they are merely junk. Such is the moving panorama of the world's progress that its views appear, like opportunity, but once upon the scene and are gone. How appropriate, therefore, is its title "Modern Seamanship." It has to do with seamanship as it exists today, when every sea is charted, when even the rise and fall of the tides in every part of the world is computed by machinery, when hurricanes can hurl their awful force against the ocean liner—not to destroy but merely to check. "The hurricane reached its maximum at twelve and the Kronprinz Wilhelm checked down"—the dispatches will say. Checked down to what? To 19 knots. Twenty-five years ago there wasn't a steamship afloat that could make 19 knots in the smoothest sea that ever was sailed. This is the seamanship the book deals with. It embraces all, the old and the new, but its great virtue is that it is distinctly modern.

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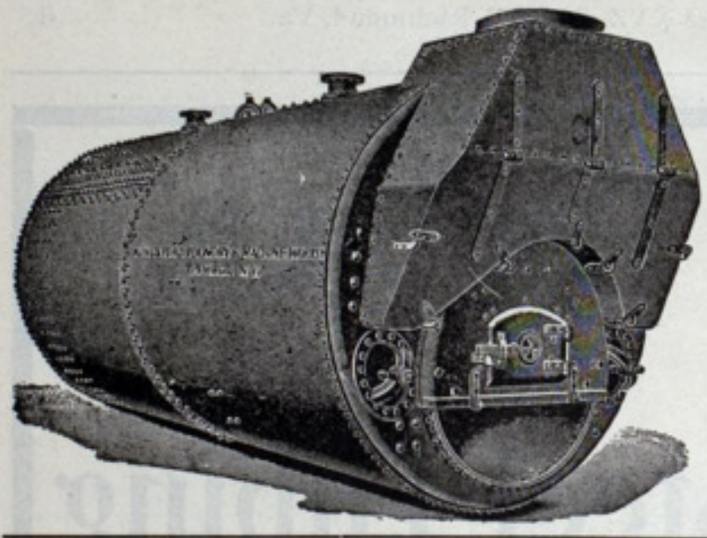

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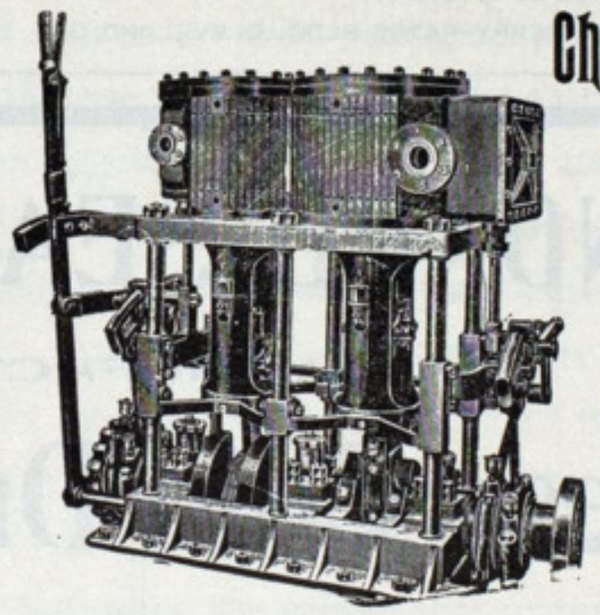

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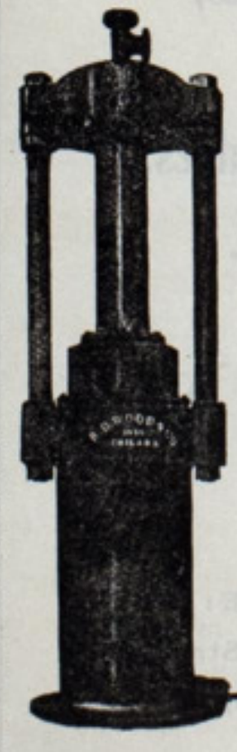

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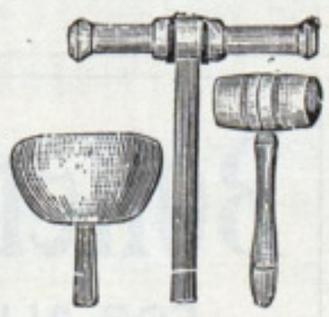

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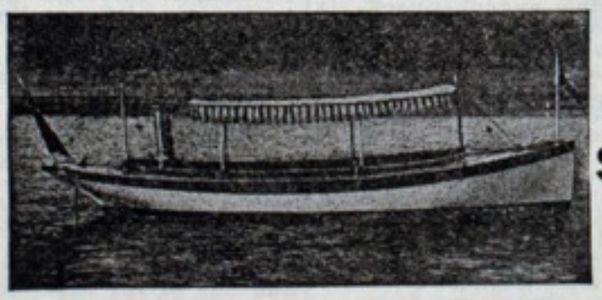

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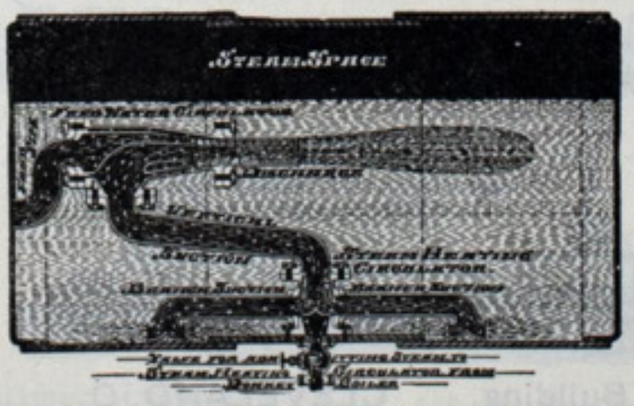

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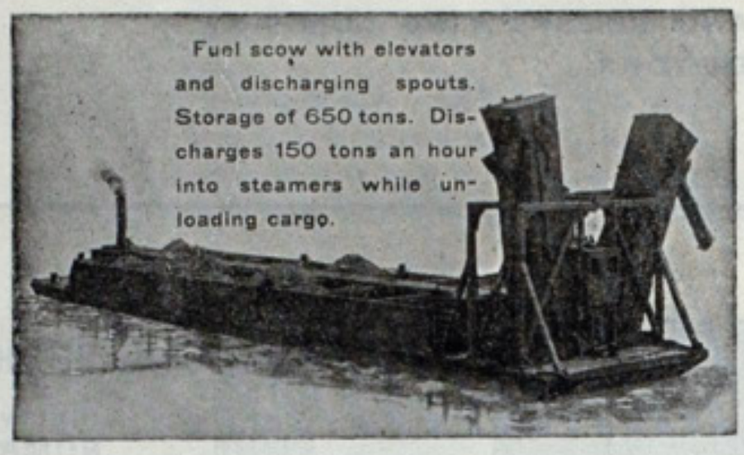

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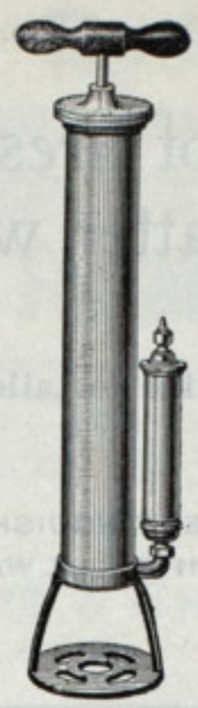

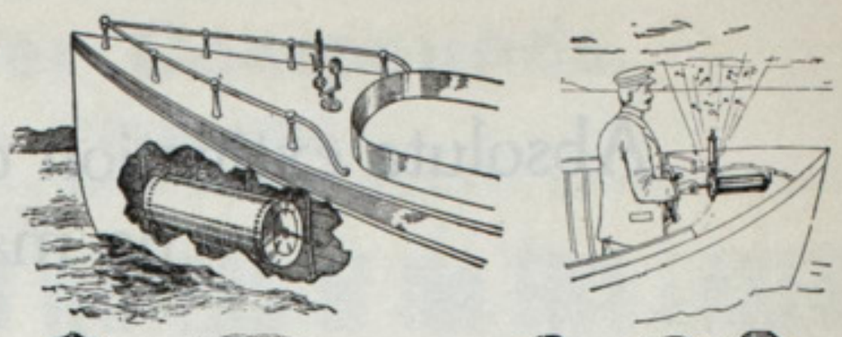

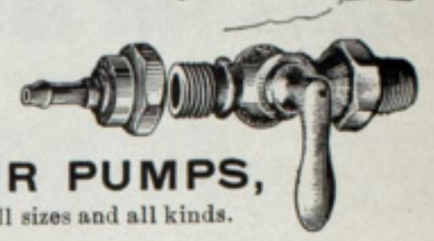

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AIR COMPRESSORS, AIR HOISTS, ETC.

"Long Arm" System Co.....Cleveland.

AIR PUMPS AND APPLIANCES.

Gleason-Peters Air Pump Co.....New York.
Fore River Ship & Engine Co.....Quincy, Mass.

ANCHORS.

Baldt Anchor Co.....Chester, Pa.
International Anchor Co.....Cleveland.
Seaboard Steel Casting Co.....Chester, Pa.

ANTI-FRICTION METALS.

Cramp, Wm. & Sons.....Philadelphia.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.

ARTIFICIAL DRAFT FOR BOILERS.

American Blower Co.....Detroit.
American Ship Building Co.....Cleveland.
Bloomsburg & Co., H.....Newport News, Va.
Boston Blower Co.....Hyde Park, Mass.
Buffalo Forge Co.....Buffalo.
Detroit Shipbuilding Co.....Detroit.
Sturtevant, B. F. Co.....Boston.

ATTORNEYS AND PROCTORS IN ADMIRALTY.

Gilchrist, Albert J.....Cleveland.
Goulder, Holding & Masten.....Cleveland.
Hoyt, Dustin & Kelley.....Cleveland.
MacDonald, Ray G.....Chicago.
Pinney, Orestes C.....Cleveland.
Stowe & Graydon.....Chicago.
White, Johnson, McCaslin & Cannon.....Cleveland.

BAROMETERS, MARINE GLASSES, ETC.

Bliss, John & Co.....New York.
Goerz, C. P.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

BENDING AND STRAIGHTENING ROLLS.

Bement, Miles & Co.....Philadelphia.
Cleveland Punch & Shear Works Co.....Cleveland.
Niles Tool Works Co.....Hamilton, O.
Wood & Co., R. D.....Philadelphia.

BERTHS, BUNKS, BEDS.

Lein, Irvine & Co.....New York.

BLOCKS, SHEAVES, ETC.

Boston & Lockport Block Co.....Boston, Mass.
Cleveland Block Co.....Cleveland.

BLOWERS.

American Blower Co.....Detroit.
Boston Blower Co.....Hyde Park, Mass.
Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.....Boston.

BOAT NAILS AND SPIKES.

American Steel & Wire Co.....Chicago.

BOAT BUILDERS.

Drein, Thos. & Son.....Wilmington, Del.
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated.....New York.
Kahnweiler's Sons, David.....New York.
Lane & DeGroot.....Brooklyn.
Willard, Chas. P. & Co.....Chicago.

BOILER MANUFACTURERS.

Almy Water Tube Boiler Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Babcock & Wilcox Co.....New York.
Bath Iron Works, Ltd.....Bath, Me.
Boyer Water Tube Boiler Co.....New York.
Chicago Ship Building Co.....Chicago.
Cramp, Wm. & Sons.....Philadelphia.
Delaunay, Belleville & Co.....St. Denis, France.
Detroit Shipbuilding Co.....Detroit.
Farrar & Trefts.....Buffalo.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Gas Engine & Power Co.....Morris Heights, N. Y.
Hardy, John B.....Tacoma, Wash.
Harlan & Hollingsworth Co.....Wilmington, Del.
Hodge, S. F. & Co.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
Kingsford Foundry & Machine Works.....Oswego, N. Y.
MacKinnon Mfg. Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Neafie & Levy Ship & Engine Building Co..Philadelphia.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Roberts Safety Water Tube Boiler Co.....New York.
Stirling, The Co.....Chicago.
Taylor Boiler Co.....Detroit.
Trigg, Wm. R. Co.....Richmond, Va.
Willard, Chas. P. & Co.....Chicago.

BOILER COMPOUNDS.

Dearborn Drug & Chemical Works.....Chicago.
Engel & Fagersten.....Chicago.

BOILER FURNACES, FIRE FRONTS, ETC.

Continental Iron Works.....New York.

BOILER RIVETS.

Bourne-Fuller Co.....Cleveland.
Champion Rivet Co.....Cleveland.

BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

BOLT CUTTERS.

Bement, Miles & Co.....Philadelphia.
Niles Tool Works Co.....Hamilton, O.

BORING AND TURNING MILLS.

Bement, Miles & Co.....Philadelphia.
Niles Tool Works Co.....Hamilton, O.

BRASS AND BRONZE CASTINGS.

Cramp, Wm. & Sons.....Philadelphia.
Fore River Ship & Engine Co.....Quincy, Mass.
Illinois Smelting & Refining Works.....Chicago.
Phosphor Bronze Smelting Co.....Philadelphia.

BRIDGES, BUILDERS OF.

Scherzer Rolling Lift Bridge Co.....Chicago.

BUCKETS, ORE AND COAL.

Brown Hoisting & Conveying Machine Co.....Cleveland.
McMyler Mnfg. Co.....Cleveland.

CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co.....Cleveland.

CAPSTANS.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

CHAINS.

Monongahela Iron & Steel Co.....Pittsburg.
Newhall Chain Forge & Iron Co.....New York.
Standard Chain Co.....Pittsburg.

CHAIN HOISTS.

Boston & Lockport Block Co.....Boston, Mass.

CHUCKING MACHINES.

Bement, Miles & Co.....Philadelphia.
Niles Tool Works Co.....Hamilton, O.

CHUCKS FOR LATHES, DRILLS AND PLANERS.

Skinner Chuck Co.....New Britain, Conn.

CIRCULATOR, EQUILIBRIUM, with Steam Heating Attachment.

Bloomsburg & Co., H.....Newport News, Va.

CLOCKS (Marine), CHRONOMETERS, BELLS.

Ashton Valve Co.....Boston.
Bliss, John & Co.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

COAL PRODUCERS AND SHIPPERS.

Castner, Curran & Bullitt.....Philadelphia.
Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.
Rochester & Pittsburgh Coal & Iron Co.....Buffalo.

COAL AND ORE HANDLING MACHINERY.

Brown Hoisting Machinery Co., Incorporated..Cleveland.
Lidgerwood Mnfg. Co.....New York.

COMPASSES.

Bliss, John & Co.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

CORK JACKETS AND RINGS.

Armstrong Cork Co.....Pittsburgh, Pa.
Kahnweiler's Sons, D.....New York.
Lane & DeGroot.....Brooklyn.

CRANES, CONVEYORS, HOISTS.

Brown Hoisting Machinery Co., Incorporated..Cleveland.
General Electric Co.....Schenectady, N. Y.
Lidgerwood Mnfg. Co.....New York.
Niles Tool Works Co.....Hamilton, O.
Westinghouse Electric & Mnfg. Co.....Pittsburg.
Wood & Co., R. D.....Philadelphia.

CRANK PINS.

Cleveland City Forge & Iron Co.....Cleveland.

DIVING APPARATUS.

Hale Rubber Co., Alfred.....So. Boston, Mass.
Schrader's Son, A.....New York.

DRILL PRESSES—DRILLS OF ALL KINDS.

Bement, Miles & Co.....Philadelphia.
Cleveland Punch & Shear Works Co.....Cleveland.
Niles Tool Works Co.....Hamilton, O.
Pond Machine Tool Co.....Plainfield, N. J.
Pratt & Whitney Co.....Hartford, Conn.

DRILLS, PNEUMATIC.

Standard Pneumatic Tool Co.....Chicago.

DRYING APPARATUS.

American Blower Co.....Detroit.
Boston Blower Co.....Hyde Park, Mass.
Sturtevant, B. F. Co.....Boston.

DRY DOCKS.

American Ship Building Co.....Cleveland.
Bath Iron Works, Ltd.....Bath, Me.
Buffalo Dry Dock Co.....Buffalo.
Chicago Ship Building Co.....Chicago.
Craig Ship Building Co.....Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Shipbuilding Co.....Detroit.
Harlan & Hollingsworth Co.....Wilmington, Del.
Lockwood Mnfg. Co.....East Boston, Mass.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Shipowners Dry Dock Co.....Chicago.

ELECTRIC LIGHT AND POWER PLANTS.

Badt-Goltz Engineering Co.....Chicago.
Buffalo Forge Co.....Buffalo.
Electro-Dynamic Co.....Philadelphia.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Seidler-Miner Electric Co.....Detroit.
Sturtevant, B. F. Co.....Boston.
Westinghouse Electric & Mnfg. Co.....Pittsburg, Pa.

ELECTRIC HOISTS AND CRANES.

Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Lidgerwood Mnfg. Co.....New York.
Westinghouse Electric & Mnfg. Co.....Pittsburg, Pa.

ELECTRIC STEERING GEAR, SPEED AND RUDDER INDICATORS, ETC.

Electro-Dynamic Co.....Philadelphia.

ENGINE BUILDERS, MARINE.

American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Chicago Ship Building Co.....Chicago.
Chase Machine Co.....Cleveland.
Craig Ship Building Co.....Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Shipbuilding Co.....Detroit.
Farrar & Trefts.....Buffalo.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated.....New York.
Hardy, John B.....Tacoma, Wash.
Harlan & Hollingsworth Co.....Wilmington, Del.
Hodge, S. F. & Co.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich
Lake Shore Engine Works.....Marquette, Mich.
Lockwood Mnfg. Co.....East Boston, Mass.
MacKinnon Mfg. Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Olds Motor Works.....Detroit.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Roach's Ship Yard.....Chester, Pa.
Sheriffs Mnfg. Co.....Milwaukee.
Trigg, Wm. R. Co.....Richmond, Va.
Trout, H. G.....Buffalo.
Willard, Chas. P. & Co.....Chicago.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.

Cory, Chas. & Son.....New York.
Electro-Dynamic Co.....Philadelphia.
Seidler-Miner Electric Co.....Detroit.

ENGINEERING SPECIALTIES AND SUPPLIES.

Crane Co.....Chicago.
Reilly Repair & Supply Co., James.....New York.

ENGINEERS, MARINE AND MECHANICAL.

Electro-Dynamic Co.....Philadelphia.
Gaskin, Edward.....Buffalo.
Holmer & Goodenough.....New York.
Hunt, Robt. W. & Co.....Chicago.
Miller, Walter.....Cleveland.
Pittsburgh Testing Laboratory, Ltd.....Pittsburg.
Powell, Ambrose V.....Chicago.
Roelker, H. B.....New York.
See, Horace.....New York.
Wood, W. J.....Chicago.

EVAPORATING AND DISTILLING APPARATUS.

Reilly Repair & Supply Co., James.....New York.

FANS FOR VENTILATION, EXHAUST, ETC.

American Blower Co.....Detroit.
Boston Blower Co.....Hyde Park, Mass.
Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.....Boston.

FEED WATER PURIFIERS AND HEATERS.

Learmonth, Robert.....Buffalo.
Reilly Repair & Supply Co., James.....New York.
Smith, W. Blackburn.....Perth Amboy, N. J.

FIRE EXTINGUISHING APPARATUS.

Clayton Fire Extinguishing & Disinfecting Co.New York.

FIXTURES FOR LAMPS, OIL AND ELECTRIC.

Page Bros. & Co.....Boston.
Porter's Sons' Co., Wm.....New York.

FOG SIGNALS.

Colt Co., J. B.....New York.
Hamilton-Foster Fog Signal Co.....New York.

FORGES.

Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.....Boston.

FORGINGS FOR CRANK, PROPELLER OR THRUST SHAFTS, ETC.

Cleveland City Forge & Iron Co.....Cleveland.
Fore River Ship & Engine Co.....Quincy, Mass.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

FURNACES FOR BOILERS.
Continental Iron Works.....New York.

FUELING COMPANIES AND COAL DEALERS.
Castner, Curran & Bullitt (Pocahontas).....Philadelphia.
Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.
Rochester & Pittsburgh Coal & Iron Co.....Buffalo.
Smith, Stanley B. & Co.....Detroit.
Youghiogheny & Lehigh Coal Co.....Chicago.

GAS BUOYS.
Safety Car Heating & Lighting Co.....New York.

GAS AND GASOLINE ENGINES.
Chase Machine Co.....Cleveland.
Lake Shore Engine Works.....Marquette, Mich.
Olds Motor Works.....Detroit.

GAGES, STEAM AND VACUUM.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.

GRAPHITE.
Dixon Crucible Co., Joseph.....Jersey City, N. J.

GRAPHITE BUSHINGS AND BEARINGS.
Graphite Lubricating Co.....Bound Brook, N. J.

HAMMERS, PNEUMATIC.
Standard Pneumatic Tool Co.....Chicago.

HAMMERS, STEAM.
Bement, Miles & Co.....Philadelphia.
Chase Machine Co.....Cleveland.
Niles Tool Works Co.....Hamilton, O.

HATCH GEARS.
"Long Arm" System Co.....Cleveland.

HAWSERS, WIRE.
American Steel & Wire Co.....Chicago.

HEATING APPARATUS.
Sturtevant, B. F. Co.....Boston.

HOISTS FOR CARGO, ETC.
American Ship Building Co.....Cleveland.
Brown Hoisting Machinery Co., Incorporated..Cleveland.
Chase Machine Co.....Cleveland.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....New York.
Hodge, S. F. & Co.....Detroit.
Hyde Windlass Co.....Bath, Me.
Lidgerwood Mnfg. Co.....New York.
Marine Iron Co.....Bay City.
Westinghouse Electric & Mnfg. Co.....Pittsburg.

HOSE FOR PNEUMATIC TOOLS.
Sayen & Schultz.....Philadelphia.

HYDRAULIC MACHINERY.
Bement, Miles & Co.....Philadelphia.
Watson-Stillman Co., The.....New York.
Wood & Co., R. D.....Philadelphia.

ICE MACHINERY.
Roelker, H. B.....New York.

INDICATORS FOR STEAM ENGINES.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.

INJECTORS.
Crane Co.....Chicago.
Jenkins Bros.....New York.

INSURANCE, MARINE.
Brown & Co.....Buffalo.
Chamberlain & Co., S. R.....Chicago.
Drake & Maytham.....Buffalo.
Elphicke, C. W. & Co.....Chicago.
Helm, D. T. & Co.....Duluth, Minn.
Hutchinson & Co.....Cleveland.
Keith, J. G. & Co.....Chicago.
La Salle & Co.....Duluth.
Mitchell & Co.....Cleveland.
Osborn, F. H. & Co.....Chicago.
Parker, A. A. & W. B.....Detroit.
Peck, Chas. E. & W. F.....New York and Chicago.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago.
Tandy, Frank N.....Boston.

IRON ORE AND PIG IRON.
Bourne-Fuller Co.....Cleveland.
Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.

IRON OR STEEL STAYBOLTS, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

LATHES OF ALL KINDS.
Niles Tool Works Co.....Hamilton, O.
Pratt & Whitney Co.....Hartford, Conn.

LAUNCHES—NAPHTHA, ELECTRIC.
Gas Engine & Power Co.....New York.

LIFE PRESERVERS, LIFE BOATS, BUOYS, RAFTS, ETC.
Armstrong Cork Co.....Pittsburg.
Drein, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, D.....New York.
Lane & DeGroot.....Brooklyn.

LIGHTS, SIDE AND SIGNAL.
Page Bros. & Co.....Boston.
Porter's Sons' Co., Wm.....New York.

LOGS.
Walker & Son, Thomas.....Birmingham, Eng.
Also Ship Chandlers.

MACHINE TOOLS (WOOD WORKING).
Atlantic Works, Inc.....Philadelphia.

MACHINE TOOLS.
Bement, Miles & Co.....Philadelphia.
Niles Tool Works Co.....Hamilton, O.
Pond Machine Tool Co.....Plainfield, N. J.
Pratt & Whitney Co.....Hartford, Conn.

MALLETS FOR CAULKERS, BOILER MAKERS, ETC.
N. Y. Mallet & Handle Works.....New York.

MARINE RAILWAYS, BUILDERS OF
Crandall & Son, H. I.....East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.
Fogg, M. W.....New York.
Lein, Irvine & Co.....New York.

MECHANICAL DRAFT FOR BOILERS.
American Blower Co.....Detroit.
American Ship Building Co.....Cleveland.
Boston Blower Co.....Hyde Park, Mass.
Bloomsburg & Co., H.....Newport News, Va.
Buffalo Forge Co.....Buffalo.
Detroit Shipbuilding Co.....Detroit.
Sturtevant, B. F. Co.....Boston.

METALLIC PACKING.
Katzenstein, L. & Co.....New York.
U. S. Metallic Packing Co.....Philadelphia.

METALS FOR BEARINGS.
Cramp, Wm. & Sons.....Philadelphia.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.

METAL POLISH.
Bertram's Oil Polish Co.....Boston, Mass.

MILLING MACHINES OF ALL KINDS.
Bement, Miles & Co.....Philadelphia.
Niles Tool Works Co.....Hamilton, O.

NAUTICAL INSTRUMENTS.
Bliss, John & Co.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

NAUTICAL SCHOOL.
Chicago Nautical School.....Chicago.

NAVAL ARCHITECTS.
Gaskin, Edward.....Buffalo.
Holmer & Goodenough.....New York
See, Horace.....New York.
Wood, W. J.....Chicago.

OAKUM.
Stratford Oakum Co., Geo.....Jersey City, N. J.

OILS AND LUBRICANTS.
Dixon Crucible Co., Joseph.....Jersey City, N. J.
Standard Oil Co.....Cleveland.

PACKING.
Crane Co.....Chicago.
Garlock Packing Co.....Palmyra, N. Y.
Jenkins Bros.....New York.
Katzenstein, L. & Co.....New York.
Sayen & Schultz.....Philadelphia.
U. S. Metallic Packing Co.....Philadelphia.

PAINTS.
Baker, Howard H. & Co.....Buffalo.
Toch Bros.....New York.
Upson-Walton Co.....Cleveland.

PATENT ATTORNEYS.
Thurston & Bates.....Cleveland.

PATTERN SHOP MACHINERY.
Atlantic Works, Inc.....Philadelphia.

PIPE THREADING AND CUTTING MACHINES.
Merrell Mnfg. Co.....Toledo, O.

PIPE, WROUGHT IRON.
Bourne-Fuller Co.....Cleveland.
Crane Co.....Chicago.

PLANERS OF ALL KINDS.
Bement, Miles & Co.....Philadelphia.
Niles Tool Works Co.....Hamilton, O.

PLANING MILL MACHINERY.
Atlantic Works, Inc.....Philadelphia.

PLATE BENDING AND PLANING MACHINES.
Bement, Miles & Co.....Philadelphia.
Cleveland Punch & Shear Works Co.....Cleveland.
Niles Tool Works Co.....Hamilton, O.
Wood & Co., R. D.....Philadelphia.

PLUMBING, MARINE.
Reilly Repair & Supply Co., James.....New York.
Sands, Alfred B. & Son.....New York.

PNEUMATIC TOOLS.
Standard Pneumatic Tool Co.....Chicago.

POLISH FOR METALS.
Bertram's Oil Polish Co.....Boston.

POWER DOORS AND HATCHES.
"Long Arm" System Co.....Cleveland.

PRESSURE REGULATORS.
D'Este Co., Julian.....Boston.

PROPELLER WHEELS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Shipbuilding Co.....Detroit.
Farrar & Trefts.....Buffalo.
Fore River Ship & Engine Co.....Quincy, Mass.
Hardy, John B.....Tacoma, Wash.
Hyde Windlass Co.....Bath, Me.
Harlan & Hollingsworth Co.....Wilmington, Del.
Hodge, S. F. & Co.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mnfg. Co.....East Boston, Mass.
MacKinnon Mfg. Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Roelker, H. B.....New York.
Sheriffs Mnfg. Co.....Milwaukee.
Trigg, Wm. R. Co.....Richmond, Va.
Trout, H. G.....Buffalo.

PROJECTORS, ELECTRIC.
Badt-Goltz Engineering Co.....Chicago.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Rushmore Dynamo Works.....Jersey City, N. J.
Seidler-Miner Electric Co.....Detroit.
Westinghouse Electric & Mnfg. Co.....Pittsburg.

PUMPS FOR VARIOUS PURPOSES.
Blake, Geo. F. Mnfg. Co.....New York.
Kingsford Foundry & Machine Works.....Oswego, N. Y.
Wood, R. D. & Co.....Philadelphia.
Worthington, Henry R.....New York.

PUNCHES, RIVETERS, SHEARS.
Bement, Miles & Co.....Philadelphia.
Cleveland Punch & Shear Works Co.....Cleveland.
Niles Tool Works Co.....Hamilton, O.
Wood, R. D. & Co.....Philadelphia.

REFRIGERATING MACHINERY.
Roelker, H. B.....New York.

REGISTER FOR CLASSIFICATION OF VESSELS.
Great Lakes Register.....Cleveland.

RELEASING HOOKS FOR DETACHING BOATS.
Standard Automatic Releasing Hook Co.....New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.
Bourne-Fuller Co.....Cleveland.
Champion Rivet Co.....Cleveland.

R. I. W. DAMP RESISTING PAINT.
Toch Bros.....New York.

RIGGING ROPE (WIRE).
American Steel & Wire Co.....Chicago.

RUBBER GOODS.
Hale Rubber Co., Alfred.....So. Boston, Mass.

RUBBER INSULATED WIRES.
Roebling's Sons, John A.....New York and Cleveland.
American Steel & Wire Co.....Chicago.

SAFETY VALVES.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.

SAIL MAKERS.
Baker, Howard H. & Co.....Buffalo.
Upson-Walton Co.....Cleveland.
Wilson & Silsby.....Boston.

SALVAGE COMPANIES.
See wrecking companies.

SEARCH LIGHTS.
Badt-Goltz Engineering Co.....Chicago.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Rushmore Dynamo Works.....Jersey City, N. J.
Seidler-Miner Electric Co.....Detroit.
Westinghouse Electric & Mnfg. Co.....Pittsburg.

SHAPERS.
Bement, Miles & Co.....Philadelphia.
Niles Tool Works Co.....Hamilton, O.
Pratt & Whitney Co.....Hartford, Conn.

SHEARS.
See punches, riveters and shears.

SHIP AND BOILER PLATES AND SHAPES.
Bourne-Fuller Co.....Cleveland.

SHIP BUILDERS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Buffalo Dry Dock Co.....Buffalo.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Chicago Ship Building Co.....Chicago.
Detroit Shipbuilding Co.....Detroit.
Fore River Ship & Engine Co.....Quincy, Mass.
Hardy, John B.....Tacoma, Wash.
Harlan & Hollingsworth Co.....Wilmington, Del.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mnfg. Co.....East Boston, Mass.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Roach's Ship Yard.....Chester, Pa.
Trigg, Wm. R. Co.....Richmond, Va.
Willard, Chas. P. & Co.....Chicago.

SHIP CHANDLERS.
Baker, Howard H. & Co.....Buffalo.
Moran Bros. Co.....Seattle, Wash.
Reilly Repair & Supply Co., James.....New York.
Upson-Walton Co.....Cleveland.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

SOUNDING APPARATUS.
Farr, C. W.....Chicago.

SPARS—LARGE SIZES.
Moran Bros. Co.....Seattle, Wash.

STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAM VESSEL FOR SALE.
Holmes, Samuel.....New York.

STEAMSHIP LINES, PASS. AND FREIGHT.
American Line.....New York.
Cleveland & Buffalo Transit Co.....Cleveland.
Clyde Line.....New York.
Dominion Line.....Boston.
Erie & Western Trans. Co.....Buffalo.
International Nav. Co.....Philadelphia.
Red Star Line.....New York.

STEEL CASTINGS.
Seaboard Steel Casting Co.....Chester, Pa.

STEERING APPARATUS.
American Ship Building Co.....Cleveland.
Chase Machine Co.....Cleveland.
Detroit Shipbuilding Co.....Detroit.
Electro-Dynamic Co.....Philadelphia.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Queen City Engineering Co.....Buffalo.
Sheriffs Mnfg. Co.....Milwaukee.

STOCKS, BONDS, SECURITIES.
Wright, Herbert & Co.....Cleveland.

STOCKLESS ANCHORS.
Baldt Anchor Co.....Chester, Pa.
International Anchor Co.....Cleveland.

SUBMARINE DIVING APPARATUS.
Hale Rubber Co., Alfred.....So. Boston, Mass.
Schrader's Son, A.....New York.

SURVEYORS, MARINE.
Holmer & Goodenough.....New York
Gaskin, Edward.....Buffalo.
See, Horace.....New York.
Wood, W. J.....Chicago.

TELEGRAPH—DECK AND ENGINE ROOM.
Cory, Chas. & Son.....New York.

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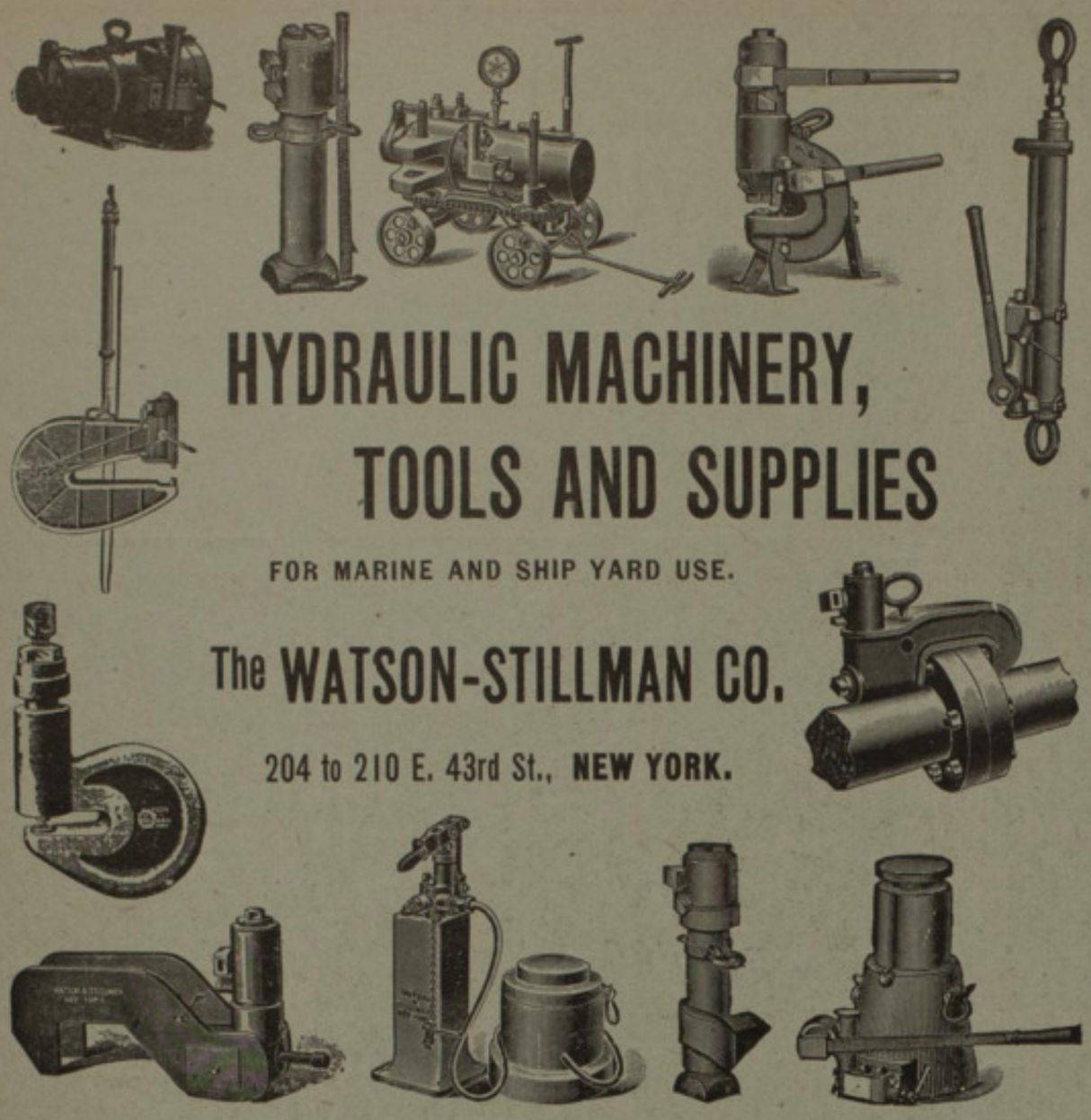

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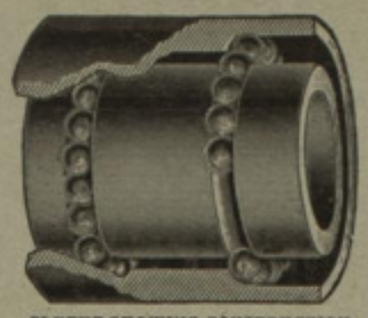

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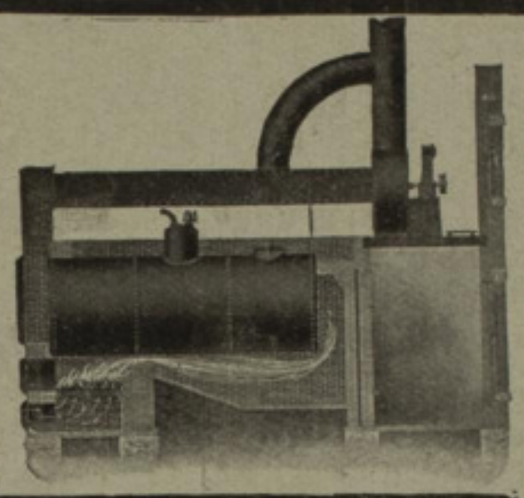

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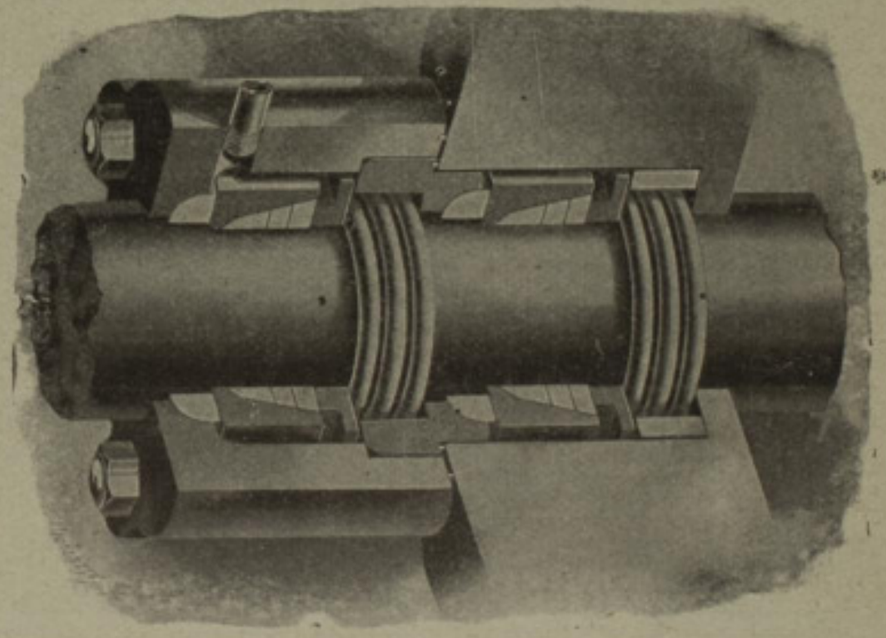

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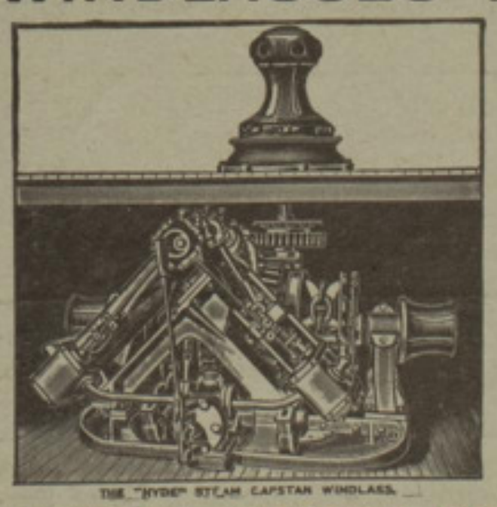

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MARINE REVIEW

VOL. XXIV. CLEVELAND, O., NOVEMBER 14, 1901. No. 20

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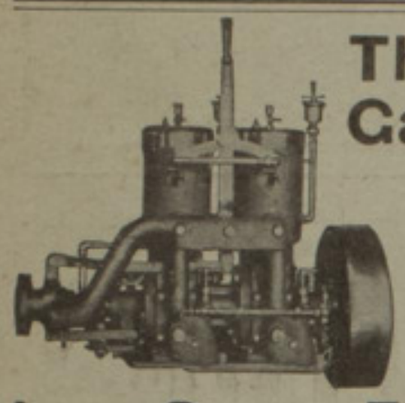

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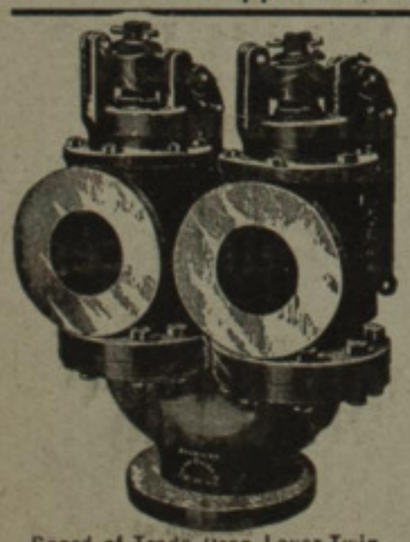

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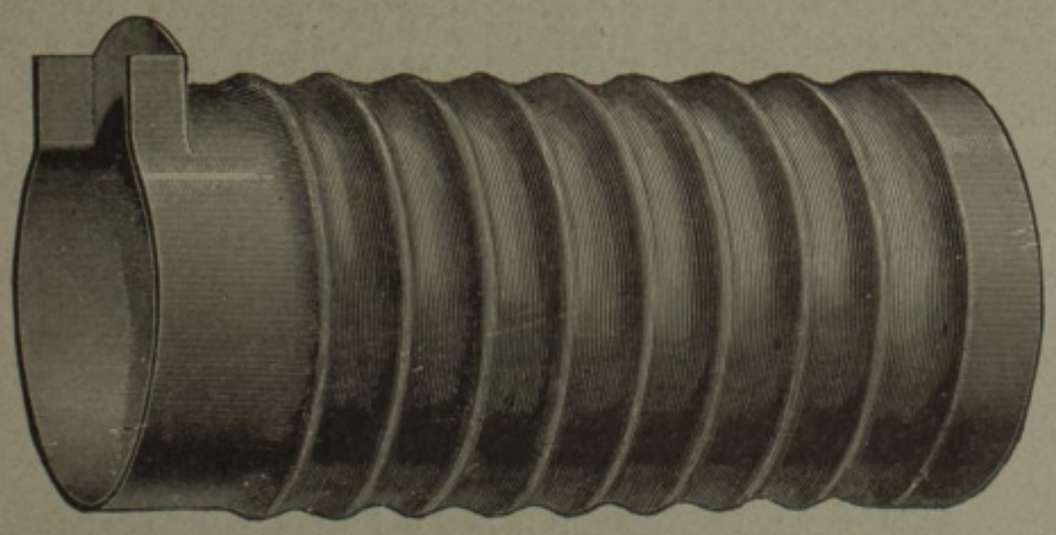

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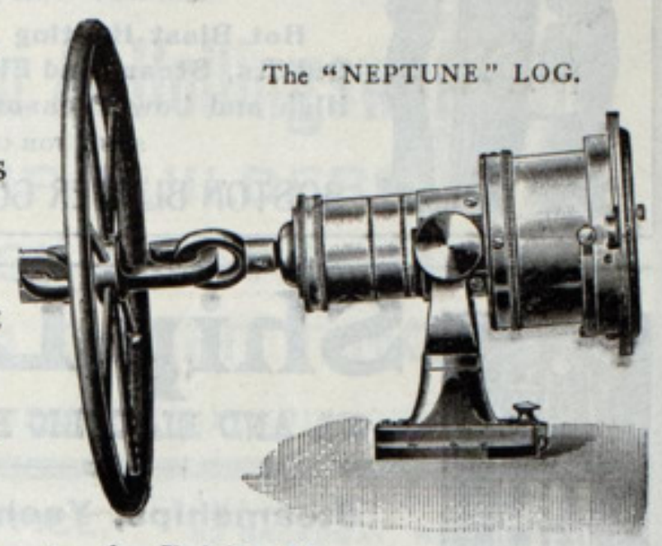

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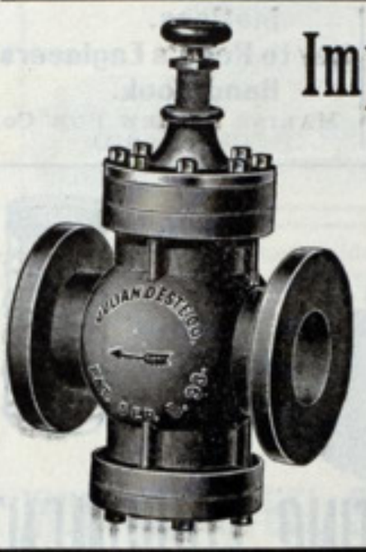

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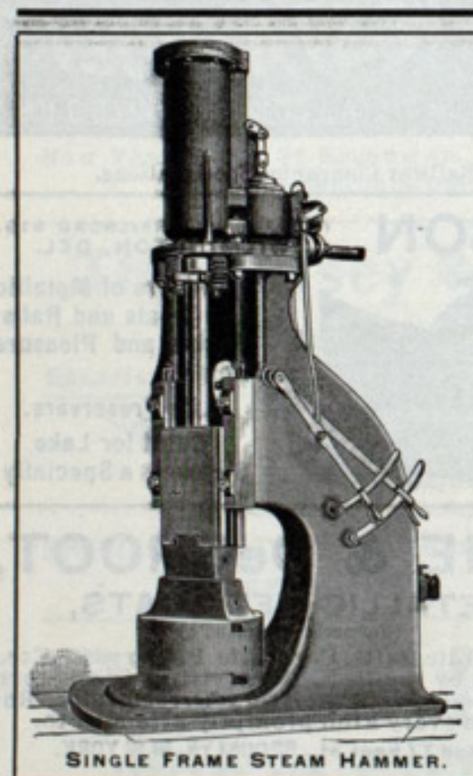

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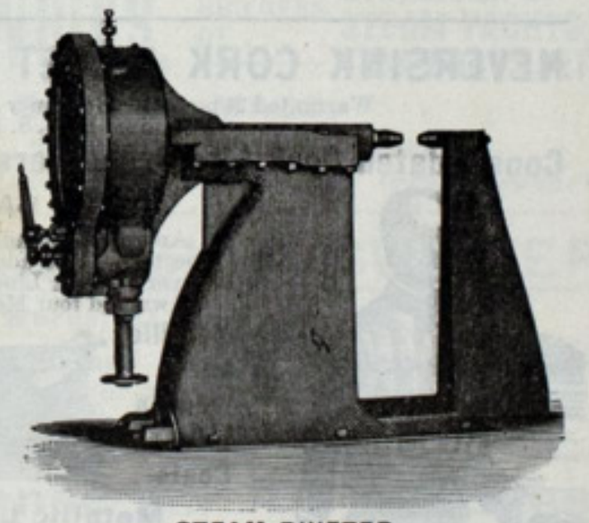

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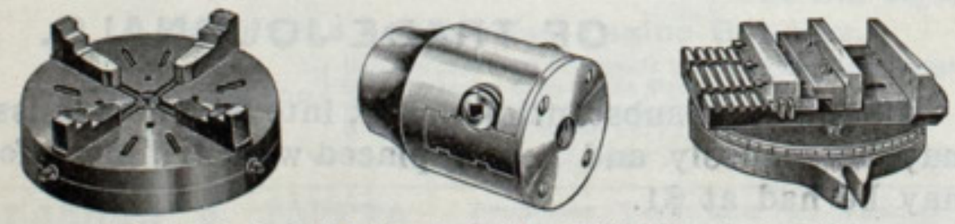

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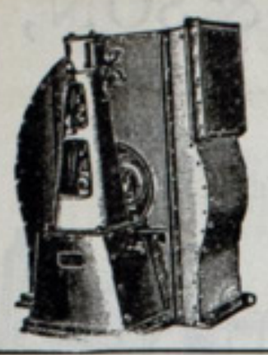

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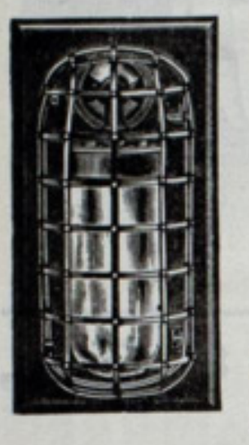

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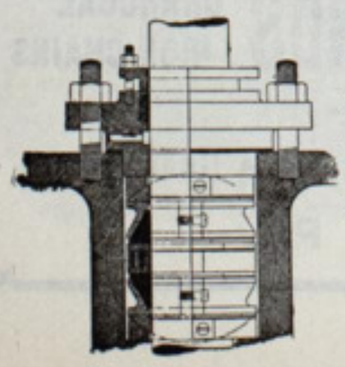

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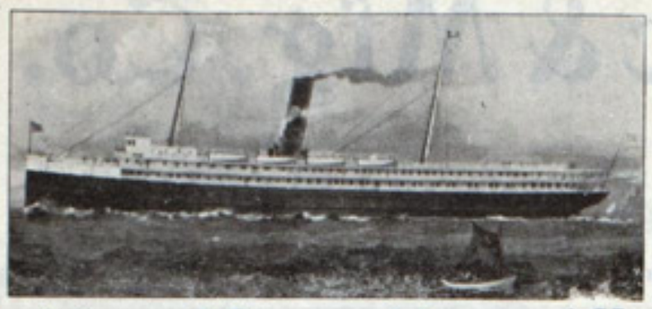

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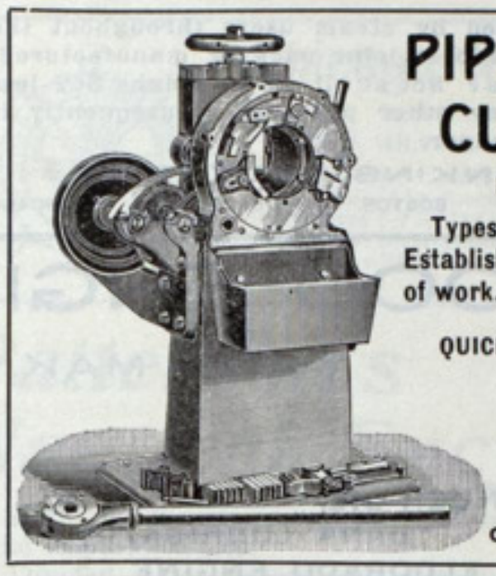

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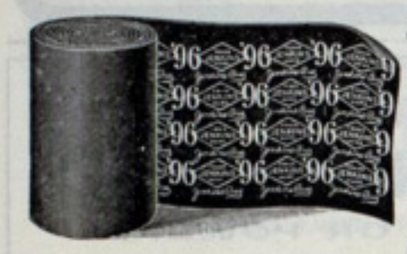

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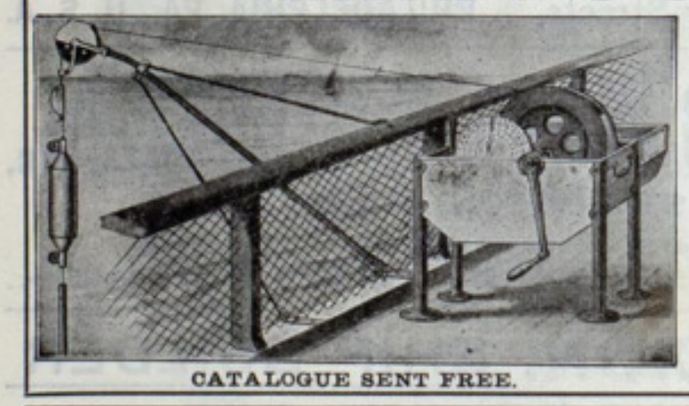

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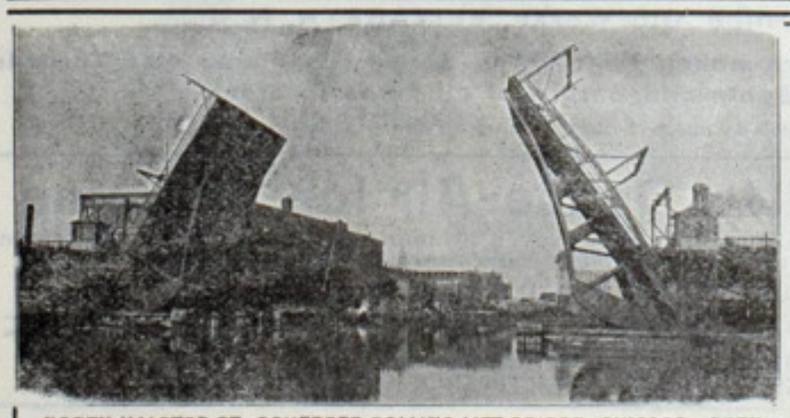

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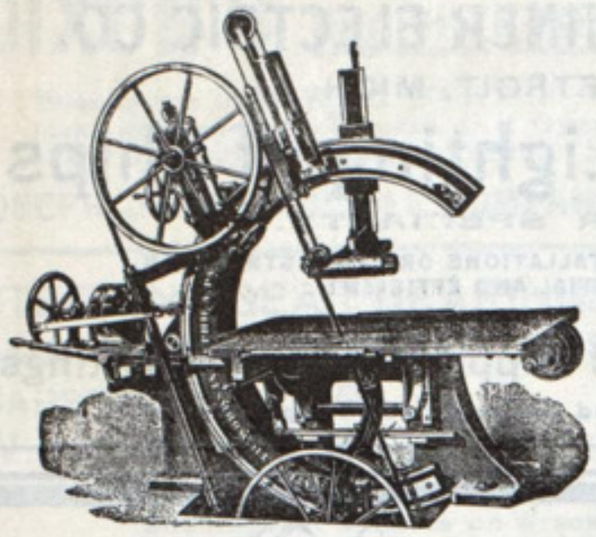

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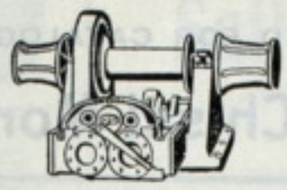

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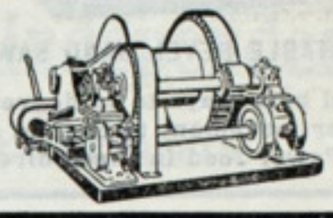

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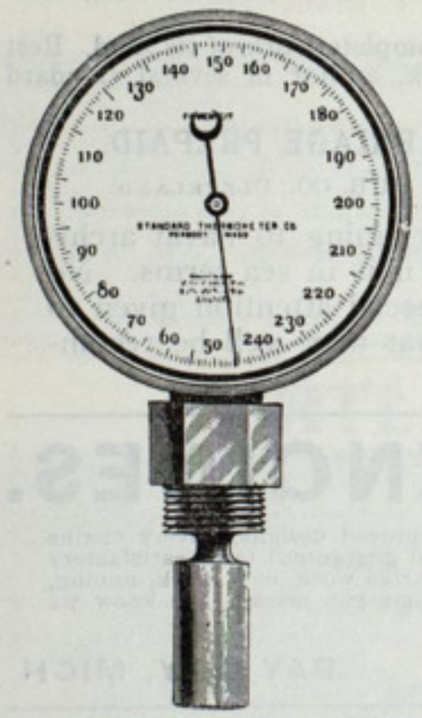

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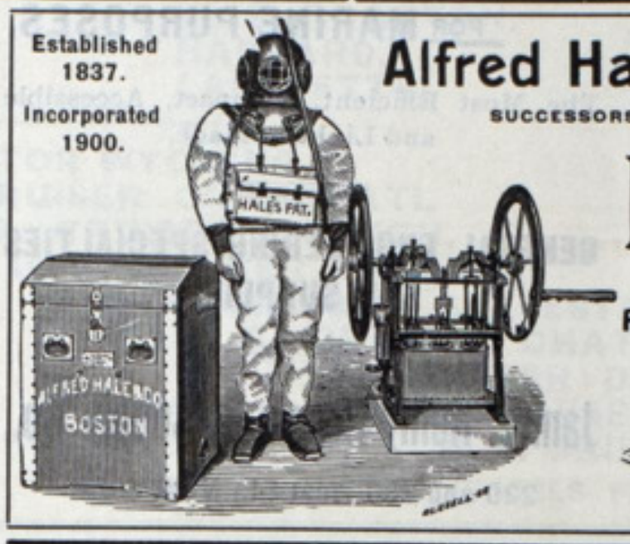

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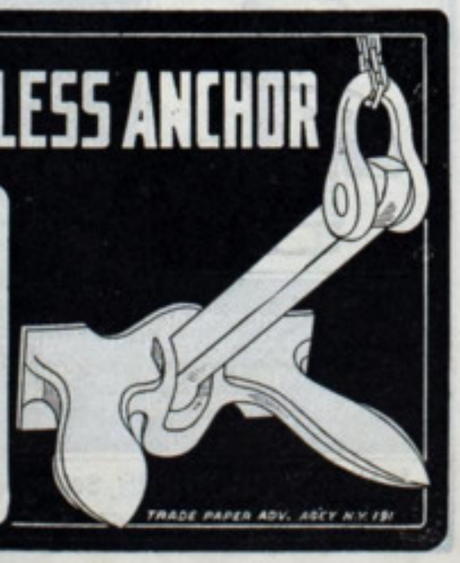

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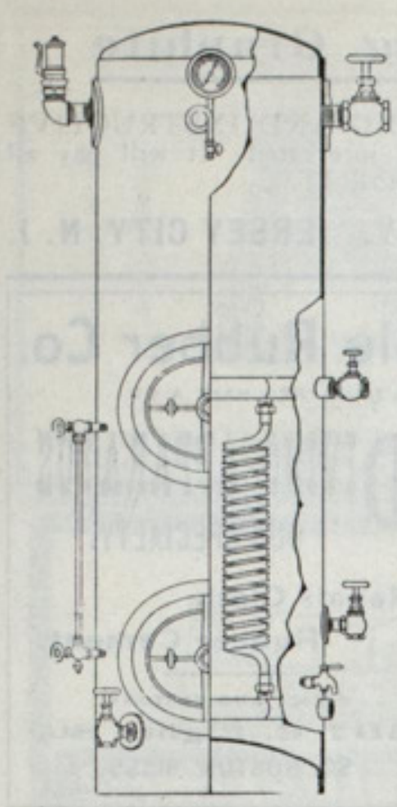

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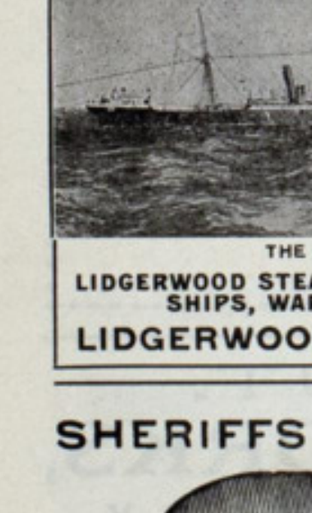

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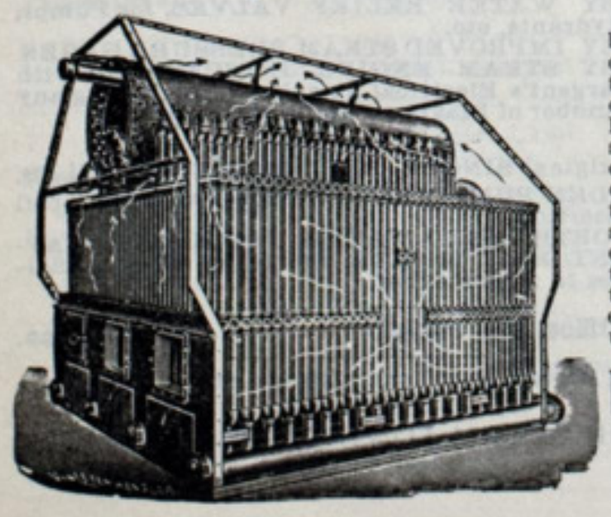

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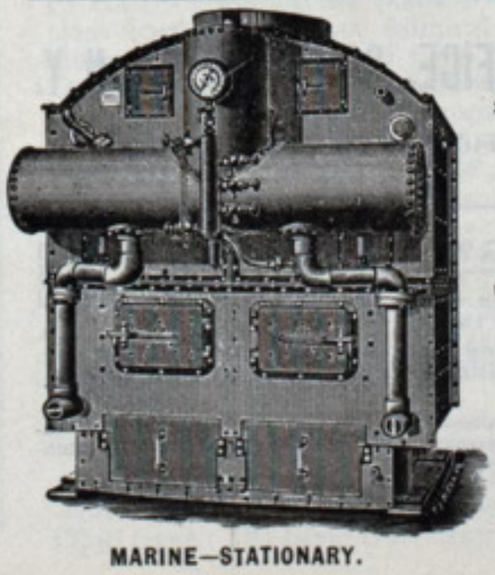

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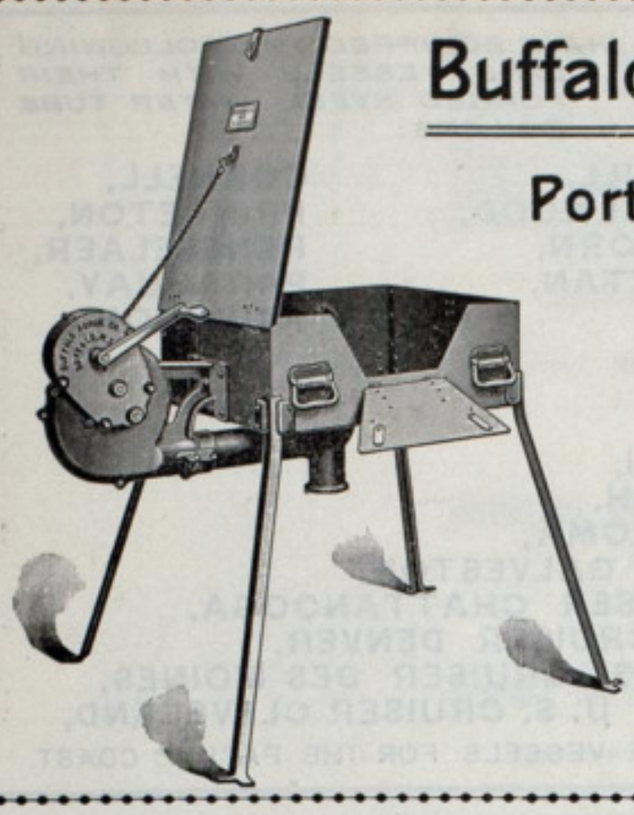

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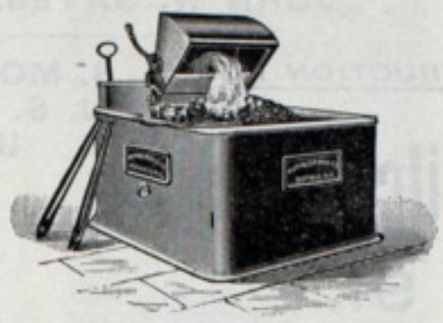

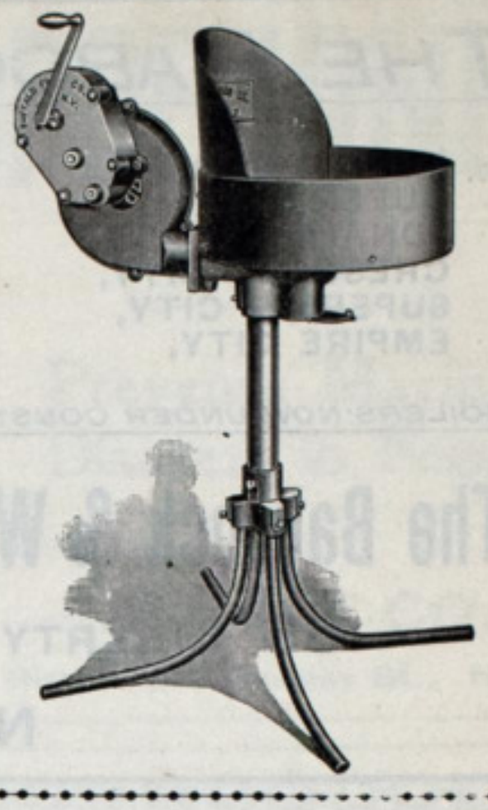

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